# Rico Surface Water Sampling Supplemental Surface Water Quality Monitoring Rico, Colorado Data Summary Report

Prepared for: Atlantic Richfield Company 900 East Benson Blvd Anchorage, Alaska 99508

Prepared by:



977 West 2100 South Salt Lake City, UT 84119 (801) 972-6222

**March 2011** 

# Rico, Colorado Surface Water Sampling Report December 2010 Sampling Event

# **Table of Contents**

1.0 Introduction	1
2.0 Field Sampling	1
2.1 Sampling Frequency	
2.2 Water Quality and Flow Measurement Sampling Locations	
2.3 Sampling Station Description	
3.0 Sampling Analysis Parameters and Methods	2
4.0 Flow Measurement Methods	4
5.0 Analytical Results	5
6.0 Quality Control	5
6.1 Field QC	
6.2 Laboratory QC	

# **List of Figures**

Figure 1 Surface Water Sampling Locations
Figure 2 St Louis Pond Area Sampling Locations

# **List of Tables**

Table 1	Sampling Location Summary
Table 2	Analytical Procedures Summary
Table 3	Sampling Information and Flow Measurements Summary
Table 4	Analytical Sample Results Summary
Table 5	Duplicate DR-51 RPD
Table 6	Sampling QC Results - Lab Preparation Blanks
Table 7	Sampling QC Results – Lab Control Sample
Table 8	Sampling QC Results – Lab Matrix Spike, Matrix Spike Duplicate
Table 9	Sampling QC Results – Lab Matrix Duplicate

# **List of Appendices**

Appendix A	Laboratory Analytical Reports
Appendix B	QC Results and Case Narrative
Appendix C	Flow Cross-Sections
Appendix D	Chain of Custody

#### Rico, Colorado Surface Water Sampling Report December 2010 Sampling Event

#### 1.0 Introduction

In accordance with the Rico Sampling and Analysis Plan for Supplemental Surface Water Quality Monitoring at Rico, CO prepared by AECOM, dated November 2010, the surface water sampling event was completed on December 3<sup>rd</sup> and 4<sup>th</sup>, 2010. Sampling was completed by Anderson Engineering Co. Inc., by technicians who are familiar with the Rico sites and the BP Control of Work Management System. Surface water samples were collected from prescribed locations within the St. Louis settling pond system and at the system discharge (002) to the Dolores River (collectively referred to as the St. Louis pond system), and previously sampled locations along the Dolores River above, at and below the St. Louis pond system. Figure 1 and Figure 2 illustrate the location of the various sampling stations. Sample results are summarized and laboratory analytical results are attached with quality control documentation.

# 2.0 Field Sampling

- **2.1 Sampling Frequency:** The sampling period represented by the December sampling event is during the low-flow season existing from October 1 through March 31.
- **2.2** Water Quality and Flow Measurement Sampling Locations: Samples were collected from the locations described on Table 1 and shown on Figure 1 and Figure 2.

The Dolores River was sampled above the St. Louis pond system, and below the adit outfalls downstream of the reclaimed Silver Swan Mine area. The river was also sampled at the USGS gaging station downstream of the Silver Swan site.

TABLE 1
Sample Location Summary

SITE ID	SITE DESCRIPTION
DR-4-SW	Dolores River below Silver Swan
DR-1	Dolores River above St. Louis settling pond system
DR-2	Dolores River immediately above the St. Louis settling pond system outfall
DR-3	St. Louis tunnel discharge at adit
DR-50 (DR-4)	Discharge of Pond 15
DR-51 (DR-5)	Discharge of Pond 8
DR-6	St. Louis settling pond system outfall to the Dolores River
DR-7	Dolores River below St. Louis settling pond system outfall
DR-G	Dolores River at USGS gaging station #09165000

#### 2.3 Sampling Station Description

The sampling requirements and stations are described in detail below:

- **DR-4-SW.** Dolores River below Silver Swan. Sampling/flow measurement location is on the Dolores River below the Silver Swan site just downstream of a bend in the river and below a cemetery on the east bank. Flow measurement by flowmeter was not collected during this sampling period due to ice cover over the Dolores River.
- **DR-1.** Dolores River above St. Louis settling ponds system. The sampling/flow measurement location is on the Dolores River approximately 50 feet upstream of the Rico Ranger Station. Flow measurement by flowmeter was not collected during this sampling period due to ice cover over the Dolores River.
- **DR-2.** Dolores River immediately above the St. Louis settling pond system outfall. Sampling/flow measurement location is on the Dolores just above the 002 discharge outfall, and upstream of the hot tub discharge. The site is located directly adjacent to the thermal discharge which supplies the hot tub. Flow measurement was collected by flowmeter.
- **DR-3.** St. Louis tunnel discharge at adit entrance. Sampling location is approximately 3 feet inside the cinder block structure at the former adit entrance. Flow measurement by an installed 9" flume downstream of the sampling location.
- **DR-50 (DR-4).** Discharge of Pond 15. Flow measurement by flowmeter.
- **DR-51 (DR-5).** Discharge of Pond 8. Flow measures were not assembled at this sampling location due to multiple small discharge points and ice cover.
- **DR-6.** St. Louis settling ponds system outfall to the Dolores River (Outfall 002). Flow measurement by installed flume.
- **DR-7.** Dolores River below St. Louis settling ponds system outfall. Sampling/flow measurement location is located just off the entrance road to the St. Louis ponds site where the Dolores River is adjacent to the entrance road. The site is located approximately 75 feet downstream from a large bend in the river that first brings the Dolores adjacent to the entrance road. Flow measurement is by flowmeter.
- **DR-G.** Located at the USGS gauging station #09165000. Flow measurement by flowmeter was not collected this sampling period due to ice cover over the Dolores River.

### 3.0 Sampling and Analysis Parameters and Methods

All samples were collected as grab samples. Samples were collected from well-mixed locations, which are representative of conditions within the flow stream. Lab-certified plastic bottles were used to collect sample water for hardness analyses. Sample water for dissolved metals analysis and potentially dissolved

metals analysis were first collected in a clean plastic bottle, and within ten minutes, filtered through a 0.45µm filter into a sample bottle containing nitric acid preservative. Sample water for total recoverable metals analysis was collected without filtration in a sample bottle containing nitric acid preservative. For quality control purposes, one duplicate sample and one field blank was included with the water samples being submitted to the laboratory for analysis.

Water samples were analyzed for pH, temperature, conductivity, alkalinity, hardness, plus the trace metals cadmium, copper, cyanide, iron, lead, manganese, nickel, selenium, silver, chromium, and zinc depending on location as described below. TDS and TSS were not laboratory analyzed in this event but will be included in future sampling.

#### Sampling Parameters:

- Cadmium, copper, manganese, lead, selenium, silver, and zinc dissolved at all sampling stations, plus total recoverable at the St. Louis adit and potentially dissolved at the pond system discharge
- Cyanide WAD in the Dolores River above and below the St. Louis ponds
- Iron total recoverable at all sampling stations, and dissolved at the St. Louis adit, pond system discharge, and all sites along the Dolores River
- Nickel dissolved and potentially dissolved at the St. Louis adit and pond system discharge, dissolved above and below the ponds
- Chromium total recoverable at all sampling stations

Field parameters were measured at the time of sample collection. Field measurement data for pH, temperature, conductivity, and alkalinity were recorded and also placed on sample collection forms. A Hanna Instruments HI98130 field instrument was used for field pH/EC. Field alkalinity was obtained using LaMotte Insta-Test 3 color-metric strips. The field instrument was calibrated prior to use with Hanna calibration and maintenance standard solutions and consistent with manufacture's instructions. Weather parameters including temperature and precipitation were obtained and documented.

All sample bottles were labeled to identify sample number, date and time of collection, type of analysis, and appropriate preservative. In addition, sample analysis/chain of custody forms were completed and processed at the time of sample collection. Original chain of custody forms are signed, dated, and placed in the sample container prior to sealing the container for shipment.

Water samples were kept in cooled containers and sent to the analytical laboratory. Samples were submitted to ALS Laboratories (formerly DataChem) for analysis by analytical procedures listed on Table 2. Analyses was performed according to methods specified in 40 CFR, Part 136 or other methods approved by the EPA. Laboratory methods and reporting limits for all parameters are presented in Table 2. Laboratory results and supporting documentation including quality assurance results are contained in the Appendix to this report.

TABLE 2
Analytical Procedures Summary

Parameter	Detection Limit (MDL)	Method
Field Parameters		
pH (s.u.)		EPA 150.2
Temperature (°C)		Standard Method 2550
Conductivity (µmhos/cm)		EPA 120.1
Alkalinity (mg/L as CaCO <sub>3</sub> )	1 mg/L	EPA 310.1
General Parameters		
Hardness (mg/L as CaCO <sub>3</sub> )	1 mg/L	SM 2340 B
Total Dissolved Solids (mg/L as TDS)	10 mg/L	M 160.2 Gravimetric
Total Suspended Solids (mg/L as TSS)	5 mg/L	M 160.2 Gravimetric
Trace Metals		
Cadmium (μg/L as Cd)	0.1 μg/L	M 200.8 ICP - MS
Chromium (ug/l as Cr)	0.1 ug/L	M 200.8 ICP - MS
Copper (μg/L as Cu)	1 μg/L	M 200.8 ICP - MS
Cyanide (μg/L as CN)	5-10 μg/L	Low-level WAD
Iron (μg/L as Fe)	10 μg/L	M 200.7 ICP
Lead (μg/L as Pb)	0.1 μg/L	M 200.8 ICP - MS
Manganese (μg/L as Mn)	5 μg/L	M 200.8 ICP - MS
Nickel (μg/L as Ni)	10 μg/L	M 200.8 ICP - MS
Selenium (ug/l as Se)	3 ug/L	M 200.8 ICP - MS
Silver (ug/L as Ag)	0.05 ug/L	M 200.8 ICP - MS
Zinc (μg/L as Zn)	10 μg/L	M 200.7 ICP

#### 4.0 Flow Measurement Methods

Flows were measured at the river sampling locations where accessible. The Dolores River was frozen over at most sampling locations or an ice and snow shelf existed along the bank making access unsafe. The flow measurements obtained this sampling period are described in Section 2.3. Flow velocity was measured for sampling locations DR-1, DR-50(DR-4), DR-51(DR5), DR-6, DR-2 and DR-7. Cross-sectional areas could safely be obtained at two river sample locations, DR-2 and DR-7 (refer to Figure 3 and Figure 4 in Appendix C). The flowrates are presented on Table 3.

Flowrates collected during this sampling event were made by use of a Marsh-McBirney Flow-Mate Model 2000 portable flow meter using the six-tenths-depth method. This method uses the velocity at six-tenths of the depth as the mean velocity. This method is generally reliable between depths from 0.3 feet to 2.5 feet. Stream sections were selected with the desired characteristics of parallel flows, smooth streambed with minimal obstructions, a straight channel, and a flat streambed. The stream section, perpendicular to the flow was measured in feet. The width of the section was determined and divided into several vertical sections. Flow measurements of velocity (by the six-tenths-depth method) and water depth were measured at each vertical section using the Marsh-McBirney flow meter and wading rod assembly. The flow meter was set to the 10 second fixed period average mode. A minimum of three velocity readings were recorded at each vertical section. Flows were calculated for each stream section using the water depth, horizontal distance, and averaged velocity data.

The St. Louis tunnel flow (DR-3) and St. Louis pond discharge (DR-6) currently have Parshall flumes installed. Flow measurements were determined for the Parshall flumes and are also shown on Table 3.

#### 5.0 Analytical Results

The results of the laboratory analysis are summarized on Table 4. The data is organized by sample location. The laboratory results report is contained in Appendix A.

#### 6.0 Quality Control

In addition to the standard laboratory Quality Control (QC), field QC samples for this sampling event included a field duplicate and a Field Blank (FB).

#### 6.1 Field QC

A field duplicate water sample was collected from sample location DR-51(DR-5). During sample collection, the duplicate sample bottles were filled simultaneously from the discharge stream of water. The duplicate sample was submitted to the analytical laboratory with the label of DR-52, so as to serve as a "blind duplicate."

Table 5 compares the analytical results from DR-51(DR-5) and DR-52 and presents the Relative Percent Difference (RPD). The RPD for aqueous samples should be +/- 20%. All comparative values were within +/-20%.

An FB was collected by pouring distilled water through the filtering manifold after the first day of sampling and decontaminating the equipment. The FB was analyzed for the same constituents as the other samples. The FB had below detectable concentrations for all metals. The pH was neutral, non-detectable EC and a low level alkalinity.

Table 5
Duplicate of DR-51(DR-5)
Relative Percent Difference (RPD)
December 2010 Sample Event

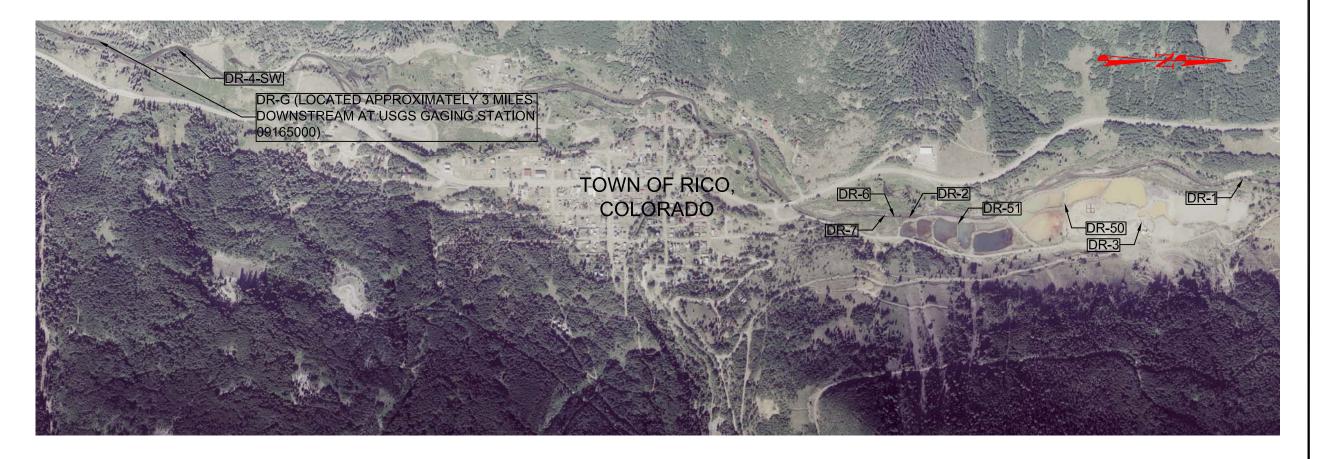
Analyte (Total)	DR-51 (ug/L)	DR-52 (ug/L) (Duplicate of DR-51)	RPD (%)
Cadmium	11	12	8.33
Chromium	< 0.36	<0.36	0
Copper	42	45	6.66
Iron	4400	4800	8.33
Magnesium	21000	20000	9.04
Nickel	6.4	7.1	9.85
Lead	3.7	3.9	5.13
Selenium	<0.85	<0.85	0
Silver	<1.5	<1.5	0
Zinc	2600	2900	10.34
pН	7.5	7.5	0
EC	0.77	0.77	0
Alkalinity	60	60	0
Hardness	760000	740000	2.67

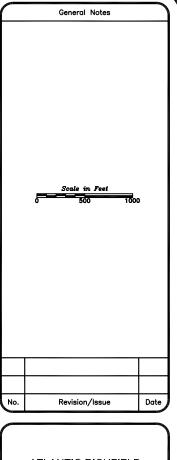
# 6.2 Laboratory QC

The laboratory control sample (LCS), method blank, matrix spike, and matrix spike duplicate sample results were all within the established limits of concentration, percent recovery, and relative percent difference, with several minor exceptions under the following:

- Matrix QC- matrix spikes with cadmium and iron flagged, results not within historical/performance limits. Post digestion spike also flagged the same two metals. RPD between matrix spike and spike duplicates are within method control limits
- Instrument QC Copper above the PQL

QC results are summarized in Tables 6 through 9 with the Laboratory results presented in Appendix B. Details regarding laboratory QC results are explained in the ALS Laboratory Group Case Narrative, also included in Appendix B.





ATLANTIC RICHFIELD COMPANY



DRAWN BY: MAD

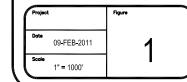
ENGINEER: CS, MAD

APPROVED:

RICO SURFACE WATER SAMPLING

WATER SAMPLING LOCATIONS - ALL

RICO, CO



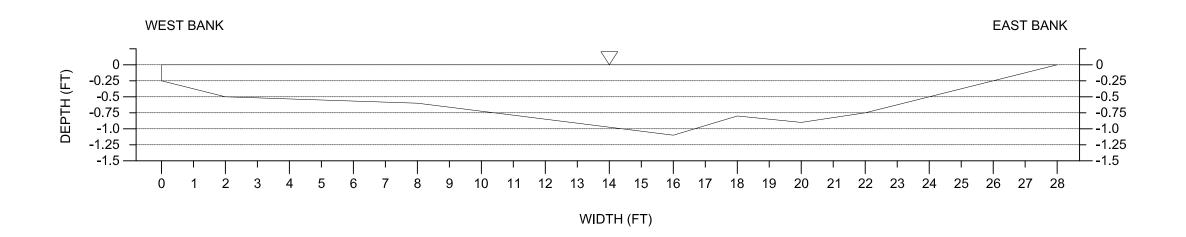


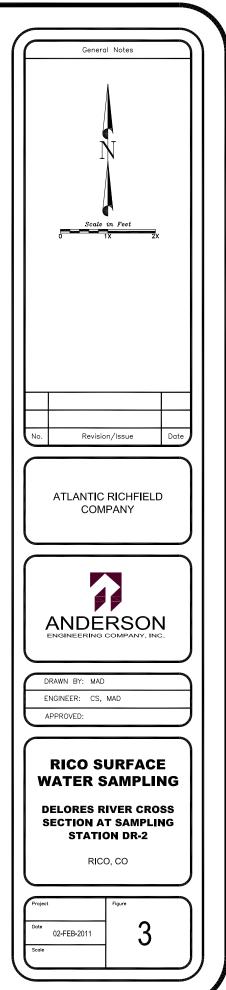
General Notes Revision/Issue ATLANTIC RICHFIELD COMPANY ANDERSON ENGINEER: CS, MAD APPROVED: **RICO SURFACE WATER SAMPLING** WATER SAMPLING LOCATIONS St. Louis Pond Area RICO, CO

09-FEB-2011

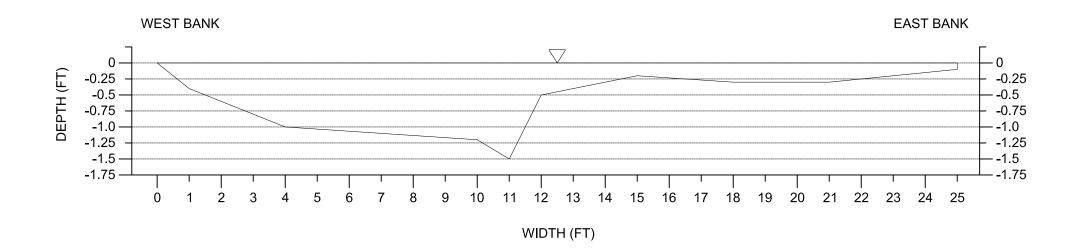
THESE PLANS AND SPECIFICATIONS ARE THE PROPERTY OF ANDERSON ENGINEERING COMPANY, INC., 977 WEST 2100 SOUTH, SALT LAKE CITY, UTAH, 84119 AND SHALL NOT BE COPIED, REDUCED, OR REPRODUCED WITHOUT THEIR WRITTEN PERMISSION.

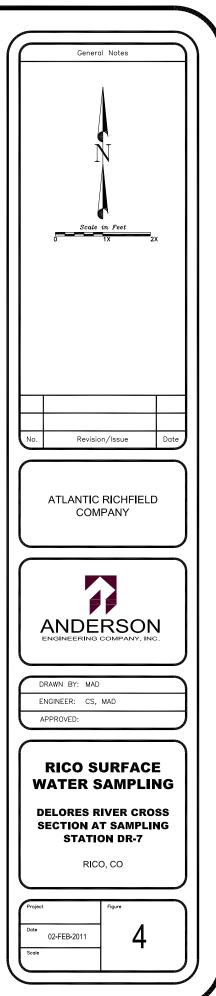
# DR-2 STREAM CROSS SECTION





# DR-7 STREAM CROSS SECTION





**TABLE 3 - Sampling Information and Flowrates** 

		Field (	Measureme	ents		GPS L	ocation		Sampling Ir	nformation	Flo	ow measurements		
					Hardness (as							Stream Cross	Flowrate	
Sample Location	рН	Temp (°C)	EC (mS)	Alkalinity (ppm)	CaCO3) (mg/l)	Latitude	Longitude	Time	Date	Ву	Velocity (ft/s)	section area (ft^2)	(cfs)	Comments
DR-1	7.89	4.5	0.15	100	150	37°42'37.6"	108°01'56.0"	2:15 PM	12/3/2010	C. Sanchez, M. DeFriez	1.76	CNO*	CNO*	Dolores above settling ponds, Ice shelf prevented safe access for cross-section
DR-2	7.47	5.6	0.2	60	190	37°42'03.96"	108°01'49.89"	11:45 AM	12/4/2010	C. Sanchez, M. DeFriez	2.13	18.35	39.1	Above outfall to Dolores River (~150 ft). Cross section measurements taken
DR-3	7.12	15.8	0.99	140	750	37°42'27.5"	108°01'50.3"	3:10 PM	12/3/2010	C. Sanchez, M. DeFriez	N/A	N/A	1.55	St Louis adit discharge. Parchal Flume, depth = 7.625" deep
DR-4-SW	7.36	5.2	0.28	95	280	37°40'49.4"	108°02'09.0"	2:38 PM	12/4/2010	C. Sanchez, M. DeFriez	N/A	CNO*	CNO*	Dolores River below Silver Swan (~100 ft). Ice shelf prevented safe access for flow reading
DR-6	7.02	5	0.75	100	800	37°42'02.4"	108°01'50.2"	11:57 AM	12/4/2010	C. Sanchez, M. DeFriez	8.40	N/A	1.21	Outfall to Dolores River. Parchal Flume, depth = 6.5" deep
DR-7	7.29	5.8	0.41	70	410	37°42'01.8"	108°01'50.5"	12:45 PM	12/4/2010	C. Sanchez, M. DeFriez	2.73	14.75	40.3	Below outfall to Dolores River (~250 ft) Cross section measurements taken
DR-50 (DR-4)	7.87	11	0.87	70	740	37°42'19.7"	108°01'52.7"	4:20 PM	12/3/2010	C. Sanchez, M. DeFriez	6.94	0.1863	1.29	Pond 15 discharge
DR-51(DR-5)	7.5	6.3	0.77	60	760	37°42'08.8"	108°01'49.7"	10:48 AM	12/4/2010	C. Sanchez, M. DeFriez	0.34	N/A	N/A	Pond 8 was discharging at multiple small locations as well as the spillway. Flow velocity measurements
											3.33	N/A	N/A	were collected at the spillway and at two other flow paths. Due to the shallow water, multiple paths, ice,
											1.51	N/A	N/A	accurate flow estimates could not be determined for this sampling location and period.
DR-52	7.5	6.3	0.77	60	740	37°42'08.8"	108°01'49.7"	11:15 AM	12/4/2010	C. Sanchez, M. DeFriez	N/A	N/A	N/A	DR-52 is a duplicate sample of DR-51. See notes for DR-51.
DR-G	8.12	2	0.24	110	280	37°38'19.8"	108°03'36.5"	3:10 PM	12/4/2010	C. Sanchez, M. DeFriez	N/A	CNO*	CNO*	Dolores River at USGS gaging station. Ice shelf prevented safe access for flow reading
FB	7	0	4.5	10	ND	N/A	N/A	9:11 AM	12/4/2010	C. Sanchez, M. DeFriez	N/A	N/A	N/A	Field blank

<sup>\*</sup>CNO - Could not obtain, flow under ice



TABLE 4 - Rico Colorado Surface Water Sampling Results Summary - December 2010 (μg/L)

DR-1: Delores River above St. Louis settling pond system

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рΗ	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR1-120310	12/3/2010	Total	<0.31	< 0.36	<0.83	310	7000	0.61	< 0.64	<0.85	<1.5	260	N/A	7.89	4.5	0.15	150	100
RICO-DR1-120310	12/3/2010	Dissolved	<0.31	< 0.36	<0.83	270	6500	0.58	<0.64	<0.85	<1.5	14	N/A	7.89	4.5	0.15	150	100
RICO-DR1-120310	12/3/2010	WAD	-	-	-	-	-	-	-	-	-	-	<1.3	ı	-	-		-
Surface Water Quality Standards																		

DR-2: Delores River immediately above the St. Louis settling pond system outfall

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рН	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR2-120410	12/4/2010	Total	<0.31	<0.36	< 0.83	390	7900	0.69	<0.64	<0.85	<1.5	16	N/A	7.47	5.6	0.2	190	60
RICO-DR2-120410	12/4/2010	Dissolved	<0.31	< 0.36	< 0.83	360	7600	0.81	< 0.64	< 0.85	<1.5	43	N/A	7.47	5.6	0.2	190	60
Surface Water Quality Standards																		

DR-3: St. Louis tunnel discharge at adit

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рΗ	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR3-120310	12/3/2010	Total	16	0.68	200	13000	18000	6.2	18	< 0.85	<1.5	3500	N/A	7.12	15.8	0.99	750	140
RICO-DR3-120310	12/3/2010	Dissolved	13	< 0.36	12	3200	18000	6.8	< 0.64	< 0.85	<1.5	3200	N/A	7.12	15.8	0.99	750	140
Surface Water Quality Standards																		

DR-4-SW: Delores River below Silver Swan

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рН	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR4SW-120410	12/4/2010	Total	0.84	< 0.36	1.7	610	10000	1.2	< 0.64	<0.85	<1.5	190	N/A	7.36	5.2	0.28	280	95
RICO-DR4SW-120410	12/4/2010	Dissolved	0.8	< 0.36	0.86	510	9600	1.3	<0.64	<0.85	<1.5	210	N/A	7.36	5.2	0.28	280	95
Surface Water Quality Standards																		

DR-6: St. Louis settling pond system outfall to the Delores River (Outfall 002)

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рН	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR6-120410	12/4/2010	Total	10	< 0.36	31	3900	21000	6.3	2.9	< 0.85	<1.5	2400	N/A	7.02	5	0.75	800	100
RICO-DR6-120410	12/4/2010	Dissolved	9.3	< 0.36	2.7	1900	21000	6.6	<0.64	< 0.85	<1.5	2400	N/A	7.02	5	0.75	800	100
Surface Water Quality Standards																		

DR-7: Delores River below St. Louis settling pond system outfall

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рН	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR7-120410	12/4/2010	Total	3.9	< 0.36	30	3300	12000	2.6	3.6	< 0.85	<1.5	950	N/A	7.29	5.8	0.41	410	70
RICO-DR7-120410	12/4/2010	Dissolved	2.9	< 0.36	1.5	740	12000	2.5	<0.64	<0.85	<1.5	740	N/A	7.29	5.8	0.41	410	70
RICO-DR7-120410	12/4/2010	WAD	-	-	-	-	-	-	-	-	-	-	<1.3	-	-	-		-
Surface Water Quality Standards								·										

DR-50: Discharge of Pond 15

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рН	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR50-120310	12/3/2010	Total	13	< 0.36	88	6600	19000	6.7	7.1	<0.85	<1.5	3100	N/A	7.87	11	0.87	740	70
RICO-DR50-120310	12/3/2010	Dissolved	11	< 0.36	2.4	1800	21000	7	< 0.64	< 0.85	<1.5	2500	N/A	7.87	11	0.87	740	70
Surface Water Quality Standards																		

DR-51: Discharge of Pond 8

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рΗ	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR51-120410	12/4/2010	Total	11	< 0.36	42	4400	21000	6.4	3.7	< 0.85	<1.5	2600	N/A	7.5	6.3	0.77	760	60
RICO-DR51-120410	12/4/2010	Dissolved	9.4	< 0.36	2.3	1700	18000	6.5	<0.64	<0.85	<1.5	2300	N/A	7.5	6.3	0.77	760	60
Surface Water Quality Standards																		



TABLE 4 - Rico Colorado Surface Water Sampling Results Summary - December 2010 (μg/L)

DR-52: Discharge of Pond 8 (Duplicate of Sample DR-51)

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рΗ	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DR52-120410	12/4/2010	Total	12	< 0.36	45	4800	20000	7.1	3.9	< 0.85	<1.5	2900	N/A	7.5	6.3	0.77	740	60
RICO-DR52-120410	12/4/2010	Dissolved	9.6	< 0.36	2.3	1800	21000	6.6	<0.64	< 0.85	<1.5	2300	N/A	7.5	6.3	0.77	740	60
Surface Water Quality Standards																		

DR-G: Delores River at USGS gaging station #09165000

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рН	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-DRG-120410	12/4/2010	Total	0.54	< 0.36	1.2	560	10000	1.1	< 0.64	< 0.85	<1.5	150	N/A	8.12	2	0.24	280	110
RICO-DRG-120410	12/4/2010	Dissolved	0.49	< 0.36	< 0.83	440	9400	1.2	<0.64	< 0.85	<1.5	130	N/A	8.12	2	0.24	280	110
Surface Water Quality Standards																		

# FB: Field Blank

Field Sample ID	Date Collected	Fraction	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Cyanide	рΗ	Temp (°C)	EC (mS)	Hardness (mg/L)	Alkalinity(ppm)
RICO-FB-120410	12/4/2010	Total	<0.31	< 0.36	<0.83	<39	<14	<0.4	< 0.64	< 0.85	<1.5	<2.4	N/A	7	4.5	0	<3.0	10
RICO-FB-120410	12/4/2010	Dissolved	<0.31	< 0.36	<0.83	<39	<14	<0.4	<0.64	< 0.85	<1.5	<2.4	N/A	7	4.5	0	<3.0	10
Surface Water Quality Standards																		



TABLE 6 - Lab Preparation Blanks

Description	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Hardness
QC Sample	BL-197406	BL-208744									
Date	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	3/4/2011
Time	23:52	23:52	23:52	23:52	23:52	23:52	23:52	23:52	23:52	23:52	0:00
Result	ND	ND									
MDL	0.31	0.356	0.829	39.1	13.7	0.4	0.637	0.851	1.5	2.38	3
RL	107	2	2	2100	50	2	2	5	5	5	10
QC Sample	BL-197407										
Date	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	12/17/2010	
Time	23:59	23:59	23:59	23:59	23:59	23:59	23:59	23:59	23:59	23:59	
Result	ND										
MDL	0.31	0.356	0.829	39.1	13.7	0.4	0.637	0.851	1.5	2.38	
RL	107	2	2	2100	50	2	2	5	5	5	·



TABLE 7 - Laboratory Control Sample

Description	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Hardness
QC Sample	LCS-197408	LCS-197408	LCS-197408	LCS-197408	LCS-197408	LCS-197408	LCS-197408	LCS-197408	LCS-197408	LCS-197408	LCS-208745
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	3/4/2011
Time	0:36	0:36	0:36	0:36	0:36	0:36	0:36	0:36	0:36	0:36	0:00
Result	258	271	267	786	816	268	262	256	254	276	105
Target	250	250	250	800	800	250	250	250	250	250	100
% Recovery	103	109	107	98.3	102	107	105	102	101	110	105
QC Limits	90.1 / 113.3	90 / 112.2	89.2 / 114.6	90 / 106.2	16 / 172.4	89.9 / 114.1	91.2 / 111.3	75.9 / 123.6	36.2 / 154.5	88.6 / 115	80 / 120
QC Sample	LCS-197409	LCS-197409	LCS-197409	LCS-197409	LCS-197409	LCS-197409	LCS-197409	LCS-197409	LCS-197409	LCS-197409	
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	
Time	0:41	0:41	0:41	0:41	0:41	0:41	0:41	0:41	0:41	0:41	
Result	255	264	260	766	863	260	260	248	245	268	
Target	250	250	250	800	800	250	250	250	250	250	
% Recovery	102	105	104	95.7	108	104	104	99.2	98	107	
QC Limits	90.1 / 113.3	90 / 112.2	89.2 / 114.6	90 / 106.2	16 / 172.4	89.9 / 114.1	91.2 / 111.3	75.9 / 123.6	36.2 / 154.5	88.6 / 115	



TABLE 8 - Matrix Spike - Matrix Spike Duplicate

Description	Cadmium	Chromium	Copper	Iron	Nickel	Lead	Selenium	Silver	Zinc
Original Result	ND	ND	ND	310	0.61	ND	ND	ND	260
QC Sample (MS)	MS-197413	MS-197413	MS-197413	MS-197413	MS-197413	MS-197413	MS-197413	MS-197413	MS-197413
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010
Time	1:00	1:00	1:00	1:00	1:00	1:00	1:00	1:00	1:00
Result	43.8	221	214	1480	219	106	50.8	50.3	794
Target	50	200	200	1000	200	100	50	50	500
% Rec	87.5	111	107	116	109	106	102	101	107
QC Limits	90.1 / 113.3	90 / 112.2	89.2 / 114.6	90 / 106.2	89.9 / 114.1	91.2 / 111.3	75.9 / 123.6	36.2 / 154.5	88.6 / 115
QC Sample (MSD)	MSD-197414	MSD-197414	MSD-197414	MSD-197414	MSD-197414	MSD-197414	MSD-197414	MSD-197414	MSD-197414
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010
Time	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06
Result	43.9	215	209	1450	214	104	49.9	49.6	771
% Rec	87.7	107	104	113	107	104	99.8	99.3	103
RPD	0.201	2.81	2.63	2.04	2.41	1.54	1.8	1.26	2.97
QC Limits	0 / 8.3	0 / 9.8	0 / 7.3	0 / 20	0 / 20	0 / 10.7	0 / 30.2	0 / 56.5	0 / 12.2
Original Result	0.8	ND	0.86	510	1.3	ND	ND	ND	210
QC Sample (MS)	MS-197416	MS-197416	MS-197416	MS-197416	MS-197416	MS-197416	MS-197416	MS-197416	MS-197416
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010
Time	4:28	4:28	4:28	4:28	4:28	4:28	4:28	4:28	4:28
Result	43	216	208	1740	213	104	49.8	41.7	779
Target	50	200	200	1000	200	100	50	50	500
% Rec	85.9	108	104	123	106	104	99.7	83.4	113
QC Limits	90.1 / 113.3	90 / 112.2	89.2 / 114.6	90 / 106.2	89.9 / 114.1	91.2 / 111.3	75.9 / 123.6	36.2 / 154.5	88.6 / 115
QC Sample (MSD)	MSD-197417	MSD-197417	MSD-197417	MSD-197417	MSD-197417	MSD-197417	MSD-197417	MSD-197417	MSD-197417
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010
Time	4:34	4:34	4:34	4:34	4:34	4:34	4:34	4:34	4:34
Result	43.9	213	206	1730	211	104	50.3	42.1	773
% Rec	87.8	106	103	121	105	104	101	84.1	112
RPD	2.14	1.52	1.02	0.943	0.949	0.814	0.911	0.84	0.755
QC Limits	0 / 8.3	0 / 9.8	0 / 7.3	0 / 20	0 / 20	0 / 10.7	0 / 30.2	0 / 56.5	0 / 12.2



TABLE 9 - Matrix Duplicate

Description	Cadmium	Chromium	Copper	Iron	Magnesium	Nickel	Lead	Selenium	Silver	Zinc	Hardness
Original Result	ND	ND	ND	310	7000	0.61	ND	ND	ND	260	150
QC Sample	MD-197412	MD-208746									
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	3/4/2011
Time	0:54	0:54	0:54	0:54	0:54	0:54	0:54	0:54	0:54	0:54	0:00
Result	ND	ND	ND	302	6690	0.584	ND	ND	ND	244	145
RPD	N/A	N/A	N/A	2.75	4.56	4.36	N/A	N/A	N/A	6.2	3.07
QC Limits	0 / 8.3	0 / 9.8	0 / 7.3	0 / 20	0 / 20	0 / 20	0 / 10.7	0 / 30.2	0 / 56.5	0 / 12.2	0 / 20
Original Result	0.8	ND	0.86	510	9600	1.3	ND	ND	ND	210	
QC Sample	MD-197415										
Date	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	12/18/2010	
Time	4:04	4:04	4:04	4:04	4:04	4:04	4:04	4:04	4:04	4:04	
Result	0.847	ND	0.92	539	9730	1.41	ND	ND	ND	224	
RPD	5.71	N/A	6.74	5.44	1.33	8.19	N/A	N/A	N/A	6.27	
QC Limits	0 / 8.3	0 / 9.8	0 / 7.3	0 / 20	0 / 20	0 / 20	0 / 10.7	0 / 30.2	0 / 56.5	0 / 12.2	





**Environmental Division** 

# **Analytical Documentation**

# Analysis Information

Analysis: SV	V 6020 - Water								
Format 4 - Re	port ND < LOD, (R) if Lo	OD <= R				Units			
		Due Date	Posting	Aux 1	Aux 2	Aux 3	Det. Lim.	Reporting	
Lab ID	Client ID	12/15/10	ug/L				ug/L	ug/L	
1034412001	DR-1	Cadmíum,	Chromium, Cor	per, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412002	DR-3	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412003	DR-50	Cadmium,	Chromium, Cop	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412004	FB	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412005	DR-51	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412006	DR-52	Cadmium,	Chromium, Cop	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412007	DR-6	Cadmium,	Chromium, Cop	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412008	DR-2	Cadmium,	Chromium, Cop	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412009	DR-7	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412010	DR-4-SW	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412011	DR-G	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412012	DR-1D	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412013	DR-3D	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	ı, Silver, Zinc		
1034412014	DR-50D	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412015	FBD	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412016	DR-51D	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412017	DR-52D	Cadmium,	Chromium, Cor	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412018	DR-6D	Cadmium,	Chromium, Cop	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412019	DR-2D	Cadmium,	Chromium, Cor	oper, Iron, Magr	nesium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412020	DR-7D	Cadmium,	Chromium, Cop	oper, Iron, Magr	nesium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412021	DR-4-SW	Cadmium,	Chromium, Cop	oper, Iron, Magr	nesium, Nickel,	Lead, Selenium	n, Silver, Zinc		
1034412022	DR-GD	Cadmium,	Chromium, Cop	oper, Iron, Magr	esium, Nickel,	Lead, Selenium	n, Silver, Zinc		

# ALS Sample Preparation Electronic Log Book

Workorder and Sample Information

ALS Set ID	Sample ID	Analytes	Account
1034412	001-022	ICP-MS	8001

### **Batch Information**

Batch HBN:	EMS/2488; 59782
CLP Case:	NA
CLP SDG:	NA
Matrix:	Water
Description Book/Page	NA
Microwave:	NA
Hood:	ICP-MS

QC Information (QC's are prepared by the same method and with the same reagents as samples)

ALS QC ID	Matrix Source	Spike Source	Pipette ID	Spike Volume
197406/407 MB	ASTM Type II water	NA	NA	NA
197408/409 LCS	ASTM Type II water	9132(Al, etc.), 9133(Fe, etc.)	2163121/N50978	1.25 mL/0.20 mL
197410/411 RLVS	ASTM Type II water	9374(Al, etc.), 9133(Fe, etc.)	N50978/501003	25 uL/5 uL
197412 MD	1034412001	NA	NA ·	NA
197413/14 MS/MSD	1034412001	7624	N50978	0.5 mL
197415 MD	1034412021	NA	NA	NA
197416/17 MS/MSD	1034412021	7624	N50978	0.5 mL
Spiked by: KB	Witness: NA			

**Method Reagents** 

1 mL of 1:1 HNO <sub>3</sub> /1210070	Pipette # 2163121
MS-10-429 (41	84/69)
	- h

Balance ID:	NA NA
Measured With:	Digestion tubes
Digestion Vessel:	50 mL polypropylene tubes
Final Container:	50 mL polypropylene tubes
Amount of Sample:	50 mL
Final Volume:	50 mL

Sample Preparation Description

ALS SOP: IS-SW-3010, Rev. 9

Modified Method? No	If YES explain: NA	
	ved samples. K. Bitner 12/15/10 16:00 K. Bitner 12/16/10 08:15 Rinsed	
digestion tubes, watch glasses and	caps with ASTM Type II water. For each sample, MD, MS, MSD transferred	50
mL of samples to digestion tubes w	th ASTM Type II water used for QC samples. Covered samples with ribbed	
watch glasses. Spiked as indicated	above. Added 1 mL of 1:1 HNO <sub>3</sub> to all samples. Placed samples into block	(
	CP-MS(#33). Time in: 10:00. Temperature checked at 11:18, 95.0 °C. Sam	
removed from the block digester at	12:05 and allowed to cool. After cooling, the samples were brought to volum	e
with ASTM Type II water, capped a	nd shook to mix. Kristie Bitner 12/16/10 14:00	

i						
Name:	Kristie Bitner	Date:	11/30/2010	Method/SOP:	See above	

ICP-MS Water HBN: 60070

 Set ID
 Sample #'s
 Matrix
 Prep Write-up (Bk./Pg.)
 Prep Date/Time
 Prep Batch/HBN
 Analytes

 1034412
 001-022
 Water
 HBN 59782
 12/15/10 15:50
 EMS/2488; 59782
 See Below

Anlaytes: Cd, Cr, Cu, Fe, Mg, Ni, Pb, Se, Ag, Zn Conversion Factor: Water: (ug/L)(50 mL/50 mL) = 1.0 ug/L QC Conversion Factor: Water: (ug/L)(50 mL/50 mL) = 1.0 ug/L

CALIBRATION AND QC STANDARDS UTILIZED:

Book/Page ID# STD S0/ICB/CCB MS-10-451 4184/69, 70 Horizon 25X of S50 **S2** Horizon 10X of S50 S5 5X of S50 Horizon S10 9130,7622,9256(400x),10221 Horizon S50/CCVA 9130,7622,9256(100x), 10222 Horizon S200/CCV 9130,7622,8256(40x), 10223 Horizon S500 9395(2x), 10224 Horizon S1000 Horizon 9394 S1500 9395 Horizon S2000 9396, 10225 Horizon **ICV** 8164(10x), 10226 Horizon **ICSA** 8164(10x),9372(100x), 10227 Horizon **ICSAB** 7046(10,000X), MS-10-467 Horizon, 4184/70 Agilent Tune MS-10-425, 460 4184/69, 70 6020 Tune 4184/70 MS-10-453 PA Tune 4184/70 MS-10-457, 466 Rinse Blank 4184/70 MS-10-452, 468

Instrument Parameters: ICPM03 (MS310095)

Ion Lenses: 0 v **Tuning Parameters:** Extract 1: -165 v Plasma Condition: 1550 w Extract 2: -120 v RF Power: 1.92 v Omega Bias: 11 v RF Matching: 8 mm Omega Lens: -40 v Smpl Depth: 0.2 mm Torch-H: 0.2 mm Cell Entrance: -50 v Cell Exit: 10 v Torch-V: 0.60 L/min Deflect: -40 v Carrier gas: On Plate Bias: Dilution Mode: 0.4 L/min Octopole Parameters: 180 v Makeup Gas: --- % OctP RF: -8 v Optional Gas: 0.1 rps OctP Bias: Nebulizer Pump: 2 °C S/C Temp: He Gas: 0.0 mL/Min Reaction Cell: Off

Instrument Parameters: ICPM03(MS310097)

Reaction Mode:

Tuning Parameters:

Plasma Condition:

RF Power: 1550 w

RF Matching: 1.92 v

Smpl Depth: 8 mm

Torch-H: -0.1 mm

Torch-V: 0.2 mm

Carrier gas: 0.60 L/min

Dilution Mode: On

Makeup Gas: 0.4 L/min

Optional Gas: --- % Nebulizer Pump: 0.1 rps S/C Temp: 2 °C

Reaction Cell: Reaction Mode: Off Ion Lenses: 0 v
Extract 1: -200 v
Extract 2: -110 v
Omega Bias: 12.4 v
Omega Lens: -40 v
Cell Entrance: -50 v
Cell Exit: 10 v
Deflect: -40 v

Acount: 8001

Prep Method: EPA 3010M

Analysis Date: 12/17, 28/2010

Results File: MS310095, 97

**Q-Pole Parameters:** 

**Detector Parameters:** 

Q-Pole Parameters:

**Detector Parameters:** 

AMU Gain: 133

Amu Offset: 127

Axis Gain: 1.0

Axis Offset: 0.04

Discriminator: 4.5 mV

Analog HV: 1700 V

Pulse HV: 1050 V

QP Bias: -5.0 v

AMU Gain: 133

Amu Offset: 127

Axis Gain: 1.0

Axis Offset: 0.04

Discriminator: 4.5 mV

Analog HV: 1673 V

Pulse HV: 1024 V

OP Bias: -5.0 v

Analysis Method: EPA 6020M

Instrument ID: ICPM03

Analysis Batch, HBNs: EMS/2494; 60070

Analyst: Kristie Bitner

Plate Bias:
Octopole Parameters: 180 v
OctP RF: -8 v

OctP RF: -8 v OctP Bias: NA He Gas: 0.0 mL/Min

Dilutions: ICSA an ICSAB samples diluted 20x due to high target concentrations for Fe and Mg.

Comments: Two MB, RLVS, LCS samples were prepared and analyzed for these samples. Matrix duplicates, matrix spikes, matrix spike duplicates and serial dilutions were done on samples 1034412001 and 1034412021. Results for Method Blanks, LCS samples in control as are all MD results. Matrix spike and matrix spike duplicate results are flagged for cadmium and iron, results are not within Historical/Performance limits. ICV flagged for iron with result at 89.9% which rounds to 90% recovery. CCVA 200057 flagged for cadmium at 88%, CCVA(500 ug/L) is within control for cadmium at 98.3% recovery. CCVs with target of 1000 ug/L are not spiked with silver. All flagged analytes in CCVs have results in control for the other CCV in the pair. CCB-200071 is high for copper, unknown reason. All other CCB samples are within control. Serial dilution not in control for 198244. Post digestion spike not within Historical/Performance limits for cadmium in 198243 and 198241 and iron not in control for 198243.

Serial dilutions prepared by pipetting 1 mL of samples into polypropylene tubes, adding 4 mL of 1% nitric acid, capping and shaking to mix. Post digestion spike samples prepared by spiking 50 uL of solution 7624 to 5 mL of sample in a polypropylene tube, capping and shaking to mix. S2, S5 and S10 were prepared using solutions S0 and S50. S2, S5 and S10 were all prepared just prior to

MS310095,97-Wa and shaking to mix. S2, S5 and S10 were programmed analysis and expire at the end of the next day.

Pipettes R56213M (1-10 mL), 2163121 (1 mL), N50978 (20-500 uL) were used during analysis. NC/CAR2008-0281 was initiated for run MS310097 due to failure of the final CCB to be analyzed. All other CCBs analyzed and within control except for

copper in 200071.

Project No. 4835 TITLE ALS 46 - ICPMO3 Instrument Run Log book Book No. From Page No. \_3\_\_ Acch. # OFF # Time mothod Matrix WO IDS/Comments 11/16/10 5011 (10K16200) M5310084 21:12 248 min 8001 KB 17:04 6020 1030901 226 min m53 008 5 16:02 8001 1030901 - Polutions 10K17m00 11/17/10 12:16 50/1 6020 22:39 303 min Liquid 8001 10 KM+00 6000 MS 310086 4/17/10 17:36 1632120 炓 Buil 18: 101, 7003 11/22/10 1632618,19,20,1032112,1032224,25,26, 41 15:30 02:27 597min 6020 MS310087 100 1032322 23,24, 1031545, 1031244 10K22p00 Notused, software Issues 11/23/10 ms310088 110 Bulk 1033309, 1032137, 1032138, 1032140 m5310089 30 11/30/10 17:33 05:00 667min 6020,2008 8001 1032143,1030701,1032608,614,615,724,72 820,821,1031501,1032244,1032835 10430,00 24 18 24 min 1031323, 031332, 1031333 (10101,100) ms 310090 (Finesa) b 12/01/10 13:36 8001 6020 2:30 17:51 321 min NOSH 7303 Med MCB BULK 7350 BULK 7350 BULK 1350 BULK 1350 16:05 01:15 550 min NOSH6001, 739 67, NCB 1003 12/06/10 (10 LO6m00) m5310091 1032230 1032231 B 103286 1034317, 1034113, 1033412, 413, 507, ms 310092 12/13/10 10 508 10 24001 002 009 115, 228, 229, 232, 233 1034311, 312,317, 1034058 (10413900) 38 16:28 1633604, 1033607 Soil water (1044 900) m5310093 12/14/10 01:27 539min 6020 800 5 1633632, 1033634, 1033609 16619000 MS310094 12/15/10 14:10 747 min Fulk 800 103 02:37 1101 1034304, 315 314 323, 1034410, 1034703, 764, 44 03 12/17/10 16:15 09:35 500 min 20 8 M5310095 860 744,920,10344/2 10417900) To Page No. -Date Date Witnessed & Understood by me, Invented by: Recorded by:

Set ID #(s): 1033731, 1034304, 1034315, 1034316, 1034412

Sample #(s): 1034412001, 009, 1033731001-012, 1034304001, 1034315001, 103416001

Account #(s): 8001

Method: 9012/335.4 Micro-distillation

Matrix(es): Water

MDL/PQL: water: 1.34/10.ug/L

HBN(s): 59593

Prep/Analysis Date: 12/13/10

# **SAMPLE PREPARATION:**

See preparation file in folder 59593 in DataReview on Xenos.

# **ANALYSIS REAGENTS:**

 See book
 3546
 pages
 85, 88, 90

 Chloramine T
 HM 12/13/10
 Pyridine
 HM 10/18/10

 Phosphate buffer
 SA 08/03/10
 0.25 N NaOH
 HM 12/1/10

# **STANDARDS:**

Stock: 9992 Check Stocks: 8943
Intermediates: 10105 Check Intermediate: 10106
Working Standards: see prep file Check Standard: see prep file

### **INSTRUMENT:**

FILE NAME(S): 20101213001 & 20101213002

Parameters for the SmartChem (Inst. ID = WET01) can be found on the raw data.

# **CONVERSION FACTOR:**

No conversion factor for waters.

#### **DILUTIONS:**

Samples 1033731003, 004, and 009 diluted 3 fold. Samples 1033731001 and 1005 diluted 5 fold. Dilutions due to high concentration.

**COMMENTS:** none.

# **Distillation Physical Description Log**

Set ID(s): 1033731, 1034304, 1034315, 1034316, 1034412

ALS Sample #	Ma	atrix		thod	Pre	p Date		nL nple sed	Fina o Disti	f	рН	Pb/	٩с	K	I	Init.
ICV/LCSW		25 N 1OH		9012 o-dist	12/ <sup>-</sup>	13/2010	6n	nL	6n	ıL.	>12	Ne	g	Nε	g	НМ
PBW		Π						1					Ĭ	П	Ť	
S10/RLVS														П		
S50/Low Range														П		
S300/High Range	_	7					,	<b>V</b>			-					
1034412001	WA	TER					6n	ņL	İ		>12			П		
1034412009																
1033731001																
1033731002															The same	
1033731003																
1033731004																
1033731005																
1033731006																
1033731007																
1033731008														Ш		
1033731009																
1033731010																
1033731011 (MS)																
1033731012(MSD)																
1034304001																
1034315001																
1034316001			,	,		7		<b>V</b>					/			4

**Preparation:** A Lachat Micro-dist system was used for the distillation.

The ICV was prepared as 0.2mL of 50,000 ug/L stock [10106] into 50mL of 0.25N NaOH.

 $T = 0.2 \text{mL}/50 \text{mL} \times 50,000 \text{ ug/L} = 200 \text{ ug/L}$ 

The MS/MSD were prepared as 0.120mL of 5,000 ug/L stock [10105] into 6mL of sample.

T = 0.120/6mL x 5,000 ug/L = 100 ug/L

All standards were prepared by pipetting the appropriate volume of 5,000 ug/L stock [10105] into 50mL of 0.25N NaOH and adding 6mL to the distillation tube.

**Preparation Reagents:** 

0.25N NaOH: HM 12/01/10 [3546/90]

Releasing solution AP 09/17/10 [3546/87]

Comments: none.

### ALS laboratory group

### INITIAL AND CONTINUING CALIBRATION VERIFICATION SUMMARY

Analyte: Cyanide

Method: SW 9012

Matrix: water

Units: ug/L

Instrument ID: WET01

INITIAL CALIBRATION					
Target	Result	%R			
200					

Set IDs: 1033731, 4304, 4315, 4316, & 4412

Analysis Date: 13-Dec-10

Init. Cal. Source: 10106

Cont. Cal. Source: 10105

Acceptance Criteria: 90-110%

CONTINUING CALIBRATION					
Target	Target Result				
100	96.012	96.01			
200	200.185	100.1			
200	198.93	99.47			
200	194.537	97.27			
200	192.475	96.24			

# ALS laboratory group

### INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Set IDs: 1033731, 4304, 4315, 4316, & 4412 Analyte: CYANIDE Method: SW 9012 Analysis Date: 12/13/2010 Matrix: Acceptance Criteria: < 10 water ug/L Instrument ID: Units: WET01

INITIAL CALIBRATION				
Result	С			
< 10	U			

CONTINUING CALIBRATION	
Result	С
< 10	U





Report Date: January 04, 2011

Phone: (801) 972-6222 Fax: (801) 972-6235

E-mail: kcosper@andersoneng.com

Kevin Cosper Anderson Engineering Company 977 West 2100 South Salt Lake City, UT 84119

Workorder: 1034412

**Project ID: Anderson Engineering 121010** 

Purchase Order: NA

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
DR-1	1034412001	12/03/10	12/06/10	
DR-3	1034412002	12/03/10	12/06/10	
DR-50	1034412003	12/03/10	12/06/10	
FB	1034412004	12/04/10	12/06/10	
DR-51	1034412005	12/04/10	12/06/10	
DR-52	1034412006	12/04/10	12/06/10	
DR-6	1034412007	12/04/10	12/06/10	
DR-2	1034412008	12/04/10	12/06/10	
DR-7	1034412009	12/04/10	12/06/10	
DR-4-SW	1034412010	12/04/10	12/06/10	
DR-G	1034412011	12/04/10	12/06/10	
DR-1D	1034412012	12/03/10	12/06/10	
DR-3D	1034412013	12/03/10	12/06/10	
DR-50D	1034412014	12/03/10	12/06/10	
FBD	1034412015	12/04/10	12/06/10	
DR-51D	1034412016	12/04/10	12/06/10	
DR-52D	1034412017	12/04/10	12/06/10	
DR-6D	1034412018	12/04/10	12/06/10	
DR-2D	1034412019	12/04/10	12/06/10	
DR-7D	1034412020	12/04/10	12/06/10	
DR-4-SW	1034412021	12/04/10	12/06/10	
DR-GD	1034412022	12/04/10	12/06/10	





**Client:** Anderson Engineering Company **Project Manager:** Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: DR-1
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1034412001
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analy	ysis	Meti	hod -	· SW	6020
-------	------	------	-------	------	------

, , , , , , , , , , , , , , , , , , ,					
Preparation: EPA 3010, SW 6020 Water Prep Batch: EMS/2488 (HBN: 59782) Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EN	SW 6020A, Water MS/2494 (HBN: 600 12/18/2010 12:47:	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	ND	0.31	2.0	1	U
Chromium	ND	0.36	2.0	1	U
Copper	ND	0.83	2.0	1	U
Iron	310	39	100	1	
Magnesium	7000	14	50	1	
Nickel	0.61	0.40	2.0	1	J
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	260	2.4	5.0	1	

#### **Analysis Method - SW 9012**

· · · · · ·		Batch: EV	SW 9012A w/ Micro VC/2958 (HBN: 595 12/13/2010	Instr ID: WET01 Percent Solids: NA Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cyanide	ND	1.3	10	1	U

 Sample ID: DR-3
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1034412002
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

# Analysis Method - SW 6020

Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: E	SW 6020A, Water MS/2494 (HBN: 600 : 12/18/2010 1:24:18	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	16	0.31	2.0	1	
Chromium	0.68	0.36	2.0	1	J
Copper	200	0.83	2.0	1	
Iron	13000	39	100	1	
Magnesium	18000	14	50	1	
Nickel	6.2	0.40	2.0	1	
Lead	18	0.64	2.0	1	

Results Continued on Next Page





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: DR-3
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1034412002
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analy	/sis	Meti	hod -	·SW	6020
-------	------	------	-------	-----	------

Preparation:         EPA 3010, SW 6020 Water Prep           Batch:         EMS/2488 (HBN: 59782)           Prepared:         12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: El	Analysis: SW 6020A, Water Batch: EMS/2494 (HBN: 60070) Analyzed: 12/18/2010 1:24:18 AM		Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	3500	2.4	5.0	1	

Sample ID: DR-50 Matrix: Water Collected: 12/3/2010

Lab ID: 1034412003 Media: 500 mL Nalgene Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

#### Analysis Method - SW 6020

Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EM	SW 6020A, Water 1S/2494 (HBN: 6007 12/18/2010 1:48:18		Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	13	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	88	0.83	2.0	1	
Iron	6600	39	100	1	
Magnesium	19000	14	50	1	
Nickel	6.7	0.40	2.0	1	
Lead	7.1	0.64	2.0	1	
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	3100	2.4	5.0	1	





**Client:** Anderson Engineering Company **Project Manager:** Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: FB
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412004
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020
---------------------------

Preparation: EPA 3010, SW 6020 Water Prep Batch: EMS/2488 (HBN: 59782) Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: Ef	SW 6020A, Water MS/2494 (HBN: 600 12/18/2010 1:54:29	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	ND	0.31	2.0	1	U
Chromium	ND	0.36	2.0	1	U
Copper	ND	0.83	2.0	1	U
Iron	ND	39	100	1	U
Magnesium	ND	14	50	1	U
Nickel	ND	0.40	2.0	1	U
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	ND	2.4	5.0	1	U

 Sample ID: DR-51
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412005
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

### **Analysis Method - SW 6020**

Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: Ef	SW 6020A, Water MS/2494 (HBN: 600 : 12/18/2010 2:00:5	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	11	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	42	0.83	2.0	1	
Iron	4400	39	100	1	
Magnesium	21000	14	50	1	
Nickel	6.4	0.40	2.0	1	
Lead	3.7	0.64	2.0	1	
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	2600	2.4	5.0	1	





**Client:** Anderson Engineering Company **Project Manager:** Kevin W. Griffiths

Selenium

Silver

Zinc

Analytical Results Workorder: 1034412

 Sample ID: DR-52
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412006
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020					
Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: El	SW 6020A, Water MS/2494 (HBN: 6007 : 12/18/2010 2:07:01	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	12	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	45	0.83	2.0	1	
Iron	4800	39	100	1	
Magnesium	20000	14	50	1	
Nickel	7.1	0.40	2.0	1	
Lead	3.9	0.64	2.0	1	

 Sample ID: DR-6
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412007
 Media: 500 mL Nalgene
 Received: 12/6/2010

0.85

1.5

2.4

5.0

5.0

5.0

1

1

1

U

U

Sampling Site: NA Sampling Parameter: NA

ND

ND

2900

Analysis Method - SW 6020					
Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: E	SW 6020A, Water MS/2494 (HBN: 6007 : 12/18/2010 2:13:10	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	10	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	31	0.83	2.0	1	
Iron	3900	39	100	1	
Magnesium	21000	14	50	1	
Nickel	6.3	0.40	2.0	1	
Lead	2.9	0.64	2.0	1	
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	2400	2.4	5.0	1	





**Client:** Anderson Engineering Company **Project Manager:** Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: DR-2
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412008
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis M	lethod - 🤄	SW 6020
------------	------------	---------

Preparation: EPA 3010, SW 6020 Water Prep Batch: EMS/2488 (HBN: 59782) Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EN	SW 6020A, Water //S/2494 (HBN: 6007 12/18/2010 2:19:21	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	ND	0.31	2.0	1	U
Chromium	ND	0.36	2.0	1	U
Copper	ND	0.83	2.0	1	U
Iron	390	39	100	1	
Magnesium	7900	14	50	1	
Nickel	0.69	0.40	2.0	1	J
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	16	2.4	5.0	1	

 Sample ID: DR-7
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412009
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

#### Analysis Method - SW 6020

Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: El	SW 6020A, Water MS/2494 (HBN: 600 : 12/18/2010 2:25:3	70)	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	3.9	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	30	0.83	2.0	1	
Iron	3300	39	100	1	
Magnesium	12000	14	50	1	
Nickel	2.6	0.40	2.0	1	
Lead	3.6	0.64	2.0	1	
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	950	2.4	5.0	1	

Results Continued on Next Page





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: DR-7
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412009
 Media: 1000 mL Amber Glass
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 9012

Preparation: Not Applicable		Analysis:	SW 9012A w/ Micr	o Dist, Water	Instr ID: WET01
		Batch: EW	/C/2958 (HBN: 595	Percent Solids: NA	
		Analyzed:	12/13/2010		Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cvanide	ND	1.3	10	1	U

 Sample ID: DR-4-SW
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412010
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analy	sis'	Metho	od -	SW	6020
-------	------	-------	------	----	------

Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EN	SW 6020A, Water //S/2494 (HBN: 600 // 12/18/2010 2:31:40	•	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	0.84	0.31	2.0	1	J
Chromium	ND	0.36	2.0	1	U
Copper	1.7	0.83	2.0	1	J
Iron	610	39	100	1	
Magnesium	10000	14	50	1	
Nickel	1.2	0.40	2.0	1	J
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	190	2.4	5.0	1	

 Sample ID: DR-G
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412011
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

#### Analysis Method - SW 6020

Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EM	SW 6020A, Water S/2494 (HBN: 600 12/18/2010 2:38:0	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	0.54	0.31	2.0	1	J
Chromium	ND	0.36	2.0	1	

Results Continued on Next Page





U

U

1

1

1

Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Selenium

Silver

Zinc

Analytical Results Workorder: 1034412

 Sample ID: DR-G
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412011
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020					
Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: E	SW 6020A, Water MS/2494 (HBN: 6007 : 12/18/2010 2:38:00	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.
Copper	1.2	0.83	2.0	1	J
Iron	560	39	100	1	
Magnesium	10000	14	50	1	
Nickel	1.1	0.40	2.0	1	J
Lead	ND	0.64	2.0	1	U

0.85

1.5

2.4

5.0

5.0

5.0

 Sample ID: DR-1D
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1034412012
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

ND

ND

150

Analysis Method - SW 6020						
Preparation:         EPA 3010, SW 6020 Water Prep           Batch:         EMS/2488 (HBN: 59782)           Prepared:         12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: El	SW 6020A, Water MS/2494 (HBN: 6007 : 12/18/2010 2:44:13	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.	
Cadmium	ND	0.31	2.0	1	U	
Chromium	ND	0.36	2.0	1	U	
Copper	ND	0.83	2.0	1	U	
Iron	270	39	100	1		
Magnesium	6500	14	50	1		
Nickel	0.58	0.40	2.0	1	J	
Lead	ND	0.64	2.0	1	U	
Selenium	ND	0.85	5.0	1	U	
Silver	ND	1.5	5.0	1	U	
Zinc	14	2.4	5.0	1		





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: DR-3D
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1034412013
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020						
Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL		Batch: El	SW 6020A, Water MS/2494 (HBN: 600 : 12/18/2010 3:08:2	70)	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyto	ua/l	M	ח	DI	Dilution	Oual

Prepared: 12/15/2010	Final: 50 mL	Analyzed:	12/18/2010 3:08:2	Report Basis: Wet	
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	13	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	12	0.83	2.0	1	
Iron	3200	39	100	1	
Magnesium	18000	14	50	1	
Nickel	6.8	0.40	2.0	1	
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	3200	2.4	5.0	1	

 Sample ID: DR-50D
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1034412014
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020					
Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EN	SW 6020A, Water MS/2494 (HBN: 6007 12/18/2010 3:14:31	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	11	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	2.4	0.83	2.0	1	
Iron	1800	39	100	1	
Magnesium	21000	14	50	1	
Nickel	7.0	0.40	2.0	1	
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	2500	2.4	5.0	1	





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: FBD
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412015
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - S\	N	6020	)
----------------------	---	------	---

Preparation: EPA 3010, SW 6020 Water Prep Batch: EMS/2488 (HBN: 59782) Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EN	SW 6020A, Water /IS/2494 (HBN: 6007 /12/18/2010 3:20:43	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	ND	0.31	2.0	1	U
Chromium	ND	0.36	2.0	1	U
Copper	ND	0.83	2.0	1	U
Iron	ND	39	100	1	U
Magnesium	ND	14	50	1	U
Nickel	ND	0.40	2.0	1	U
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	ND	2.4	5.0	1	U

 Sample ID: DR-51D
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412016
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

#### **Analysis Method - SW 6020**

Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: Ef	SW 6020A, Water MS/2494 (HBN: 600 12/18/2010 3:27:0	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	9.4	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	2.3	0.83	2.0	1	
Iron	1700	39	100	1	
Magnesium	18000	14	50	1	
Nickel	6.5	0.40	2.0	1	
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	2300	2.4	5.0	1	





U

U

1

1

Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Selenium

Silver

Zinc

Analytical Results Workorder: 1034412

 Sample ID: DR-52D
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412017
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020					
Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: EN	Analysis: SW 6020A, Water Batch: EMS/2494 (HBN: 60070) Analyzed: 12/18/2010 3:33:15 AM		Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	9.6	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	2.3	0.83	2.0	1	
Iron	1800	39	100	1	
Magnesium	21000	14	50	1	
Nickel	6.6	0.40	2.0	1	
Lead	ND	0.64	2.0	1	U

 Sample ID: DR-6D
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412018
 Media: 500 mL Nalgene
 Received: 12/6/2010

0.85

1.5

2.4

5.0

5.0

5.0

Sampling Site: NA Sampling Parameter: NA

ND

ND

2300

Analysis Method - SW 6020					
Preparation:         EPA 3010, SW 6020 Water Prep           Batch:         EMS/2488 (HBN: 59782)           Prepared:         12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: E	SW 6020A, Water MS/2494 (HBN: 6007 : 12/18/2010 3:39:26	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	9.3	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	2.7	0.83	2.0	1	
Iron	1900	39	100	1	
Magnesium	21000	14	50	1	
Nickel	6.6	0.40	2.0	1	_
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	2400	2.4	5.0	1	





**Client:** Anderson Engineering Company **Project Manager:** Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: DR-2D
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412019
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020	
Preparation: EPA 3010, SW 6020 Water	Weight/Volume

Prep

Batch: EMS/2488 (HBN: 59782)

Prepared: 12/15/2010

Final: 50 mL

Analysis: SW 6020A, Water Instr ID: ICPM03

Batch: EMS/2494 (HBN: 60070) Percent Solids: NA

Analyzed: 12/18/2010 3:45:36 AM Report Basis: Wet

Prepared: 12/15/2010	Final: 50 mL					
Analyte	ug/L	MDL	RL	Dilution	Qual.	
Cadmium	ND	0.31	2.0	1	U	
Chromium	ND	0.36	2.0	1	U	
Copper	ND	0.83	2.0	1	U	
Iron	360	39	100	1		
Magnesium	7600	14	50	1		
Nickel	0.81	0.40	2.0	1	J	
Lead	ND	0.64	2.0	1	U	
Selenium	ND	0.85	5.0	1	U	
Silver	ND	1.5	5.0	1	U	
Zinc	12	2.4	5.0	1	_	

 Sample ID: DR-7D
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412020
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

### **Analysis Method - SW 6020**

Preparation: EPA 3010, SW 6020 Water Prep Batch: EMS/2488 (HBN: 59782)	Weight/Volume Initial: 50 mL	Batch: EM	SW 6020A, Water IS/2494 (HBN: 6007 12/18/2010 3:51:52	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Prepared: 12/15/2010	Final: 50 mL				·
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	2.9	0.31	2.0	1	
Chromium	ND	0.36	2.0	1	U
Copper	1.5	0.83	2.0	1	J
Iron	740	39	100	1	
Magnesium	12000	14	50	1	
Nickel	2.5	0.40	2.0	1	
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	740	2.4	5.0	1	





**Client:** Anderson Engineering Company **Project Manager:** Kevin W. Griffiths

Analytical Results Workorder: 1034412

 Sample ID: DR-4-SW
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412021
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020			
Preparation: EPA 3010, SW 6020 Water	<u>Weight/Volume</u>	Analysis: SW 6020A, Water	Instr ID: ICPM03
Prep		Batch: EMS/2494 (HBN: 60070)	Percent Solids: NA
Batch: EMS/2488 (HBN: 59782)	Initial: 50 mL	Analyzod: 12/18/2010 2:59:06 AM	Poport Basis: Wot

Prepared: 12/15/2010	Final: 50 mL	Analyzed	: 12/18/2010 3:58:0	6 AM	Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	0.8	0.31	2.0	1	J
Chromium	ND	0.36	2.0	1	U
Copper	0.86	0.83	2.0	1	J
Iron	510	39	100	1	
Magnesium	9600	14	50	1	
Nickel	1.3	0.40	2.0	1	J
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	210	2.4	5.0	1	

 Sample ID: DR-GD
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1034412022
 Media: 500 mL Nalgene
 Received: 12/6/2010

Sampling Site: NA Sampling Parameter: NA

Analysis Method - SW 6020					
Preparation: EPA 3010, SW 6020 Water Prep  Batch: EMS/2488 (HBN: 59782)  Prepared: 12/15/2010	Weight/Volume Initial: 50 mL Final: 50 mL	Batch: El	SW 6020A, Water MS/2494 (HBN: 6007 : 12/18/2010 4:52:43	,	Instr ID: ICPM03 Percent Solids: NA Report Basis: Wet
Analyte	ug/L	MDL	RL	Dilution	Qual.
Cadmium	0.49	0.31	2.0	1	J
Chromium	ND	0.36	2.0	1	U
Copper	ND	0.83	2.0	1	U
Iron	440	39	100	1	
Magnesium	9400	14	50	1	
Nickel	1.2	0.40	2.0	1	J
Lead	ND	0.64	2.0	1	U
Selenium	ND	0.85	5.0	1	U
Silver	ND	1.5	5.0	1	U
Zinc	130	2.4	5.0	1	





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

#### **Report Authorization**

Analysis Method - SW 6020

7		
Kristie F. Bitner	John T Kershisnik	
Analyst	Peer Review	
Analysis Method - SW 9012		
Holly Martin	Rosemary Hanks	
Analyst	Peer Review	

#### **Laboratory Contact Information**

Phone: (801) 266-7700 ALS Laboratory Group (formerly DataChem Laboratories, Inc.)

Email: alslt.lab@alsglobal.com 960 W Levoy Drive

Web: www.datachem.com Salt Lake City, Utah 84123

#### **General Lab Comments**

The results provided in this report relate only to the items tested.

Samples were received in acceptable condition unless otherwise noted.

Samples have not been blank corrected unless otherwise noted.

This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by the State of Utah, Bureau of Laboratory Improvement under NELAP for specific fields of testing as documented in its current scope of accreditation (ID# DATA1) which is available by request or on the internet at http://health.utah.gov/lab/labimp/labcert/envlabcert.html. The quality systems implemented in the laboratory apply to all methods performed by ALS regardless of this current scope of accreditation which does not include performance based methods, modified methods and methods applied to matrices not listed in the methods.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

#### **Result Symbol Definitions**

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.

RL = Reporting Limit, a verified value of method/media/instrument sensitivity.

CRDL = Contract Required Detection Limit

Reg. Limit = Regulatory Limit.

ND = Not Detected, testing result not detected above the MDL or RL.

- < This testing result is less than the numerical value.
- \*\* No result could be reported, see sample comments for details.

#### **Qualifier Symbol Definitions**

- U = Qualifier indicates that the analyte was not detected above the MDL.
- J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
- B = Qualifier indicates that the analyte was detected in the blank.
- E = Qualifier indicates that the analyte result exceeds calibration range.
- P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Set ID:

1106245

Sample ID:

see below

Matrix:

water

Analyst / Date:

Rosemary H. Hanks / 03/04/11

Analyte / Method:

Hardness / EPA 130.2

Batch/HBN ID:

EWC: 3049 / 63020

# **SAMPLE PREPARATION/ANALYSIS:**

Per SOP, this method is a manual titration (WET06, physical properties).

### **REAGENTS:**

1. Buffer solution: 03/04/11 RHH, ex. 1 month.

- 2. Erichrome Black indicator: 0.5 g mixed in 100 g NaCl (prepared before 2001, ex. not determined)
- 3. EDTA titrant (1.8615g EDTA, Fisher 716941/500mL DDI): 08/11/10 RHH ex.08/11/11 (standardized 12/09/10 by RHH as <u>0.02096N</u> see notebook 2006 facing pg. 62)
- 4. CaCO<sub>3</sub>, 0.02 N (0.20g CaCO<sub>3</sub> Mall IC1600/200 mL DDI): 08/11/10 RHH [8917] RLVS is 0.5 mL/50mL water = 10 mg/L. LCS is 5.0 mL/50mL water = 100 mg/L.

#### **RESULTS**:

ILOULIU.			
Sample ID	Sample vol	mL EDTA	Result mg/L
	<u>mL</u>		
Blank	50	0.05	1.048
LCS/QC	50	5,00	104.8
RLVS	50	0.52	10,8992
1106245001	25	3.55	148.8
-001 MD	25	3.47	145,46
-002	10	7,15	749.32
-003	16	7.05	738,84
-004	<i>5</i> 0	0.05	1.048
-005	10	7.15	759,8
-006	10	7.06	739.9
-007	10	7.63	799.62
-008	25	4.55	190.74
-009	10	3,87	405,58
-010	10	2.70	282,96
-011	10	2.67	279.82

#### **CALCULATION:**

mL EDTA X N, EDTA X 50,000 = mg (equivalence CaCO<sub>3</sub>)/L Vol. sample (mL)

#### **Analyst Note:**

MS/MSD is not applicable to this method.

# Hardness/EPA 130.2/set ID: 1106245/HBN#63020

ICV/ICB and CCV/CCB forms are not applicable, method is a manual titration.

For RUN LOG see notebook writeup





Report Date: March 07, 2011

Phone: (801) 972-6222 Fax: (801) 972-6235

E-mail: kcosper@andersoneng.com

Kevin Cosper Anderson Engineering Company 977 West 2100 South Salt Lake City, UT 84119

Workorder: 1106245

**Project ID: Anderson Engineering Company** 

Purchase Order: Rico Surface Water S

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
DR-1	1106245001	12/03/10	03/03/11	
DR-3	1106245002	12/03/10	03/03/11	
DR-50	1106245003	12/03/10	03/03/11	
FB	1106245004	12/04/10	03/03/11	
DR-51	1106245005	12/04/10	03/03/11	
DR-52	1106245006	12/04/10	03/03/11	
DR-6	1106245007	12/04/10	03/03/11	
DR-2	1106245008	12/04/10	03/03/11	
DR-7	1106245009	12/04/10	03/03/11	
DR-4-SW	1106245010	12/04/10	03/03/11	
DR-G	1106245011	12/04/10	03/03/11	





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Analytical Results Workorder: 1106245

 Sample ID: DR-1
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1106245001
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

Analysis Method - EPA 130.2

· ·			EPA 130.2, Water /C/3049 (HBN: 630 3/4/2011	Instr ID: WET06 Percent Solids: NA Report Basis: Wet		
Analyte	mg/L	MDL	RL	Dilution	Qual.	
Hardness (as CaCO3)	150	3.0	10	1		

 Sample ID: DR-3
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1106245002
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

**Analysis Method - EPA 130.2** 

Preparation: Not Applicable			EPA 130.2, Water VC/3049 (HBN: 63 3/4/2011	Instr ID: WET06 Percent Solids: NA Report Basis: Wet	
Analyte	mg/L	MDL	RL	Dilution	Qual.
Hardness (as CaCO3)	750	3.0	10	1	

 Sample ID: DR-50
 Matrix: Water
 Collected: 12/3/2010

 Lab ID: 1106245003
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

Analysis Method - EPA 130.2

Preparation: Not Applicable		Analysis:	EPA 130.2, Water		Instr ID: WET06
		Batch: EWC/3049 (HBN: 63020)			Percent Solids: NA
		Analyzed:	3/4/2011	Report Basis: Wet	
Analyte	mg/L	MDL	RL	Dilution	Qual.
Hardness (as CaCO3)	740	3.0	10	1	

 Sample ID: FB
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1106245004
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

**Analysis Method - EPA 130.2** 

·			EPA 130.2, Water	Instr ID: WET06	
		Batch: EWC/3049 (HBN: 63020)		Percent Solids: NA	
		Analyzed:	3/4/2011	Report Basis: Wet	
Analyte	mg/L	MDL	RL	Dilution	Qual.
Hardness (as CaCO3)	ND	3.0	10	1	U





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Analytical Results Workorder: 1106245

 Sample ID: DR-51
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1106245005
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

Analysis Method - EPA 130.2

·			EPA 130.2, Water VC/3049 (HBN: 63/ 3/4/2011	Instr ID: WET06 Percent Solids: NA Report Basis: Wet	
Analyte	mg/L	MDL	RL	Dilution	Qual.
Hardness (as CaCO3)	760	3.0	10	1	

 Sample ID: DR-52
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1106245006
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

**Analysis Method - EPA 130.2** 

· · ·			EPA 130.2, Water VC/3049 (HBN: 63	Instr ID: WET06 Percent Solids: NA	
	Analyzed: 3/4/2011			Report Basis: Wet	
Analyte	mg/L	MDL	RL	Dilution	Qual.
Hardness (as CaCO3)	740	3.0	10	1	

 Sample ID: DR-6
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1106245007
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

Analysis Method - EPA 130.2

Preparation: Not Applicable		Analysis:	EPA 130.2, Water		Instr ID: WET06
		Batch: EV	/C/3049 (HBN: 630	020)	Percent Solids: NA
		Analyzed: 3/4/2011			Report Basis: Wet
Analyte	mg/L	MDL	RL	Dilution	Qual.
Hardness (as CaCO3)	800	3.0	10	1	

Sample ID: DR-2 Matrix: Water Collected: 12/4/2010
Lab ID: 1106245008 Media: 500 mL Nalgene Received: 3/3/2011
Sampling Site: NA Sampling Parameter: NA

Analysis Method - EPA 130.2

Preparation: Not Applicable			EPA 130.2, Water		Instr ID: WET06	
		Batch: EW	C/3049 (HBN: 630	Percent Solids: NA		
		Analyzed:	3/4/2011	Report Basis: Wet		
Analyte	mg/L	MDL	RL	Dilution	Qual.	
Hardness (as CaCO3)	190	3.0	10	1		





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

Analytical Results Workorder: 1106245

 Sample ID: DR-7
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1106245009
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

Analysis Method - EPA 130.2

Preparation: Not Applicable			EPA 130.2, Water VC/3049 (HBN: 630 3/4/2011		Instr ID: WET06 Percent Solids: NA Report Basis: Wet
Analyte	mg/L	MDL	RL	Dilution	Qual.
Hardness (as CaCO3)	410	3.0	10	1	

 Sample ID: DR-4-SW
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1106245010
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

**Analysis Method - EPA 130.2** 

Preparation: Not Applicable		Analysis:	EPA 130.2, Water		Instr ID: WET06	
		Batch: EV	VC/3049 (HBN: 630	Percent Solids: NA		
		Analyzed:	3/4/2011	Report Basis: Wet		
Analyte	mg/L	MDL	RL	Dilution	Qual.	
Hardness (as CaCO3)	280	3.0	10	1		

 Sample ID: DR-G
 Matrix: Water
 Collected: 12/4/2010

 Lab ID: 1106245011
 Media: 500 mL Nalgene
 Received: 3/3/2011

Sampling Site: NA Sampling Parameter: NA

**Analysis Method - EPA 130.2** 

Preparation: Not Applicable		Analysis:	EPA 130.2, Water		Instr ID: WET06	
		Batch: EW	/C/3049 (HBN: 630	Percent Solids: NA		
		Analyzed:	3/4/2011	Report Basis: Wet		
Analyte	mg/L	MDL	RL	Dilution	Qual.	
Hardness (as CaCO3)	280	3.0	10	1		

#### **Report Authorization**

Analysis Method - EPA 130.2		
Rosemary Hanks	Penny A. Foote	
Analyst	Peer Review	





Client: Anderson Engineering Company Project Manager: Kevin W. Griffiths

#### **Laboratory Contact Information**

Phone: (801) 266-7700 ALS Laboratory Group (formerly DataChem Laboratories, Inc.)

Email: alslt.lab@alsglobal.com 960 W Levoy Drive

Web: www.datachem.com Salt Lake City, Utah 84123

#### **General Lab Comments**

The results provided in this report relate only to the items tested.

Samples were received in acceptable condition unless otherwise noted.

Samples have not been blank corrected unless otherwise noted.

This test report shall not be reproduced, except in full, without written approval of ALS.

ALS is accredited by the State of Utah, Bureau of Laboratory Improvement under NELAP for specific fields of testing as documented in its current scope of accreditation (ID# DATA1) which is available by request or on the internet at http://health.utah.gov/lab/labimp/labcert/envlabcert.html. The quality systems implemented in the laboratory apply to all methods performed by ALS regardless of this current scope of accreditation which does not include performance based methods, modified methods and methods applied to matrices not listed in the methods.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

#### **Result Symbol Definitions**

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.

RL = Reporting Limit, a verified value of method/media/instrument sensitivity.

CRDL = Contract Required Detection Limit

Reg. Limit = Regulatory Limit.

ND = Not Detected, testing result not detected above the MDL or RL.

- < This testing result is less than the numerical value.
- \*\* No result could be reported, see sample comments for details.

#### **Qualifier Symbol Definitions**

- U = Qualifier indicates that the analyte was not detected above the MDL.
- J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
- B = Qualifier indicates that the analyte was detected in the blank.
- E = Qualifier indicates that the analyte result exceeds calibration range.
- P = Qualifier indicates that the RPD between the two columns is greater than 40%.



#### Case Narrative

Method:

6020

Client:

Anderson Engineering

Company

Analysis:

**ICP-MS** 

Account:
Matrix:

8001 Water

**Preparation SOP #:** 

**Analysis SOP #:** 

IS-SW-3010, Rev. 9

IP-SW-6020, Rev. 9

Lot:

NA

ALS Work Order ID:

1034412

General Set Information: There are twenty two field samples in this work order. The samples were analyzed for cadmium, chromium, copper, iron, magnesium, nickel, lead, selenium, silver and zinc in water by ICP-MS.

**Method Summary:** A thoroughly mixed 50 mL portion of sample is heated in a block digester in the presence of nitric acid. After heating, samples are brought to a 50 mL final volume with ASTM Type II water. The resulting digest is analyzed using an Agilent 7700x ICP Mass Spectrometer.

**Sample Preparation:** All samples were prepared in accordance with published procedures.

Hold Times: Samples were prepared and analyzed within method hold times.

**Dilutions:** No sample dilutions were done on field samples.

**Method QC (MB, LCS):** No method analyte was found in the method blank samples at levels above the PQL. Two quality control sample were prepared and analyzed with this set. All analytes are within quality control limits.

Matrix QC (MS, MD, MSD): Two matrix duplicates were prepared and analyzed with this work order. The relative percent difference between the sample results and the matrix duplicate results are in control. Two matrix spikes and two matrix spike duplicates were prepared and analyzed with this work order. The results for the analytes in the matrix spikes are within method control limits of +/- 25% of the targets but with cadmium and iron flagged, results not within Historical/Performance limits. The relative percent differences between the matrix spike and matrix spike duplicate results are within method control limits of +/- 20%.



Instrument QC (ICV, CCV, etc): Recoveries of the analytes in the initial verification sample within control. Recoveries of analytes in continuing calibration verification samples are within quality control limits for at least one of the CCV pairs analyzed. No method analytes were found in any initial or continuing calibration blank sample at levels above the PQL except for CCB-200071 with copper above the PQL.

**Flagging Codes:** A "U" flag is used to indicate the analyte was not detected above the MDL. A "J" flag is used to indicate the analyte value is between the MDL and the RL.

**Serial Dilution:** Two serial dilutions were prepared and analyzed with this batch. The results are in control except for zinc in 198244.

**Post Digestion Spike Analysis:** Two post digestion spikes were prepared with this batch. Results within Historical/Performance limits for all spiked analytes except for cadmium in 198243 and 198241 and iron in 198243.

NC/CAR: NC/CAR2008-0281 was initiated, the last CCB sample was not analyzed.

**Sample Calculation:** The final results are calculated in  $\mu$ g/L by the equation (A) x (B) x (C) where:

A = Analyte concentration from instrument determination ( $\mu g/L$ )

Moustre-Bitner 01/04/11
Name: Kristie Bitner Da

B = [Final Volume of Digestate (L)]
[Initial Volume of Sample Used in Digestion (L)]

C = Dilution performed at time of analysis.

Miscellaneous Comments: None.



#### **Case Narrative**

Method:

SW 9012

Client:

Anderson Engineering Company

Analysis:

Cyanide

Account:

8001

Preparation SOP #:

NA

Matrix:

Water

Analysis SOP #:

SC-SW-9012

Lot/Release/SDG #:

NA

ALS Set ID:

1034412

**General Set Information:** 

The samples in this set were prepared according to EPA Method SW-9012A as described below in method summary. Cyanide analysis was performed on distillates using a SmartChem discrete auto analyzer, instrument ID: WET01. The Method Limit of Detection (MDL) is 1.34 ug/L and the

Reporting Limit (RL) is 10. ug/L for waters.

**Method Summary:** 

A 6 mL aliquot of sample was distilled using a Lachat Microdist distillation system. During distillation the cyanide, as hydrocyanic acid (HCN), was released by refluxing the sample with strong acid and the HCN was collected in an absorber-scrubber containing a sodium hydroxide solution. In the colorimetric measurement, the cyanide was converted to cyanogen chloride by reacting with Chloramine-T at a pH of less than eight without hydrolyzing to cyanate. After the reaction was complete, color was formed by the addition of pyridine-barbituric acid reagent. The cyanide ion was then determined by automated colorimetry.

Sample Preparation:

The samples were prepared as stated above in the method

summary.

**Hold Times:** 

The holding times were met for both preparation and analysis.

Dilution(s):

None required.

Method QC (MB, LCS):

LCS (ICV) data is within acceptable limits. All blank results

are below the RL.

Matrix QC (MS, MD, MSD):

The MS and MSD were within acceptable method limits.

Instrument QC (ICV, CCV, etc):

All CCVs and CCBs are within acceptable method limits.

Flagging Codes:

"U" indicates results not detected above the MDL.

NC/CAR:

None.

**Sample Calculation:** 

The results are calculated as optical density by the SmartChem software and a standard curve prepared by comparing against known concentrations of standards.

**Miscellaneous Comments:** 

None.

Name: Holly Martin

Date: 12/13/10





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) **Batch:** EMS/2494 (HBN: 60070) Analyzed By: Kristie F. Bitner

Prepared By: Kristie F. Bitner

#### Blank

MB: 197406

Analyzed: 12/17/2010 23:52

Units: ug/L				
Analyte	Result	MDL	RL	
Cadmium	ND	0.31	2	
Chromium	ND	0.356	2	
Copper	ND	0.829	2	
Iron	ND	39.1	100	
Magnesium	ND	13.7	50	
Nickel	ND	0.4	2	
Lead	ND	0.637	2	
Selenium	ND	0.851	5	
Silver	ND	1.5	5	
Zinc	ND	2.38	5	

197407

Analyzed: 12/17/2010 23:59

Units: ug/L	_		_	
Analyte	Result	MDL	RL	
Cadmium	ND	0.31	2	
Chromium	ND	0.356	2	
Copper	ND	0.829	2	
Iron	ND	39.1	100	
Magnesium	ND	13.7	50	
Nickel	ND	0.4	2	
Lead	ND	0.637	2	
Selenium	ND	0.851	5	
Silver	ND	1.5	5	
Zinc	ND	2.38	5	

#### **Laboratory Control Sample**

LCS: 197408

Analyzed: 12/18/2010 00:36

Units: ug/L						
Analyte	Result	Target	% Recovery	QC Lin	nits	
Cadmium	258	250	103	90.1	113.3	
Chromium	271	250	109	90	112.2	
Copper	267	250	107	89.2	114.6	
Iron	786	800	98.3	90	106.2	

#### **Symbols and Definitions**

- See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.





### **Analysis Information**

Workorder: 1034412

Preparation: EPA 3010, SW 6020 Water Prep Limits: Historical/Performance Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Laboratory Control Sample**

LCS: 197408

Analyzed: 12/18/2010 00:36

Units: ua/L

ag/ L						
Analyte	Result	Target	% Recovery	QC Limits		
Magnesium	816	800	102	16	172.4	
Nickel	268	250	107	89.9	114.1	
Lead	262	250	105	91.2	111.3	
Selenium	256	250	102	75.9	123.6	
Silver	254	250	101	36.2	154.5	
Zinc	276	250	110	88.6	115	

LCS: 197409

Analyzed: 12/18/2010 00:41

Units: ug/L						
Analyte	Result	Target	% Recovery	QC Lin	nits	
Cadmium	255	250	102	90.1	113.3	
Chromium	264	250	105	90	112.2	
Copper	260	250	104	89.2	114.6	
Iron	766	800	95.7	90	106.2	
Magnesium	863	800	108	16	172.4	
Nickel	260	250	104	89.9	114.1	
Lead	260	250	104	91.2	111.3	
Selenium	248	250	99.2	75.9	123.6	
Silver	245	250	98	36.2	154.5	
Zinc	268	250	107	88.6	115	

#### Matrix Spike - Matrix Spike Duplicate

197413 197414 Sample: 1034412001

Analyzed: 12/18/2010 00:47 Analyzed: 12/18/2010 01:00 Analyzed: 12/18/2010 01:06

Units: ug/L												
Analyte	Result	Result	Target	% Rec	QC Lin	nits	Result	% Rec	RPD	QC Li	QC Limits	
Cadmium	ND	43.8	50	<b>*</b> 87.5	90.1	113.3	43.9	<b>*</b> 87.7	0.201	0	8.3	
Chromium	ND	221	200	111	90	112.2	215	107	2.81	0	9.8	
Copper	ND	214	200	107	89.2	114.6	209	104	2.63	0	7.3	
Iron	310	1480	1000	<b>*</b> 116	90	106.2	1450	<b>*</b> 113	2.04	0	20	
Nickel	0.61	219	200	109	89.9	114.1	214	107	2.41	0	20	
Lead	ND	106	100	106	91.2	111.3	104	104	1.54	0	10.7	
Selenium	ND	50.8	50	102	75.9	123.6	49.9	99.8	1.8	0	30.2	
Silver	ND	50.3	50	101	36.2	154.5	49.6	99.3	1.26	0	56.5	

#### Symbols and Definitions

Page 2 of 15

- See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.

Tuesday, January 04, 2011 **QCS V1.5** 





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### Matrix Spike - Matrix Spike Duplicate

Sample: 1034412001 MS: 197413 MSD: 197414

Analyzed: 12/18/2010 00:47 | Analyzed: 12/18/2010 01:00 | Analyzed: 12/18/2010 01:06

Units: ug/L

**QC Limits** Result **RPD QC Limits Analyte** Result Result **Target** % Rec % Rec 260 88.6 115 771 0 12.2 Zinc 794 500 107 103 2.97

Sample: 1034412021 MS: 197416 MSD: 197417

Analyzed: 12/18/2010 03:58 Analyzed: 12/18/2010 04:28 Analyzed: 12/18/2010 04:34

Units: ug/L											
Analyte	Result	Result	Target	% Rec	QC Lir	nits	Result	% Rec	RPD	QC Limits	
Cadmium	0.8	43	50	<b>*</b> 85.9	90.1	113.3	43.9	<b>*</b> 87.8	2.14	0	8.3
Chromium	ND	216	200	108	90	112.2	213	106	1.52	0	9.8
Copper	0.86	208	200	104	89.2	114.6	206	103	1.02	0	7.3
Iron	510	1740	1000	<b>*</b> 123	90	106.2	1730	<b>*</b> 121	0.943	0	20
Nickel	1.3	213	200	106	89.9	114.1	211	105	0.949	0	20
Lead	ND	104	100	104	91.2	111.3	104	104	0.814	0	10.7
Selenium	ND	49.8	50	99.7	75.9	123.6	50.3	101	0.911	0	30.2
Silver	ND	41.7	50	83.4	36.2	154.5	42.1	84.1	0.84	0	56.5
Zinc	210	779	500	113	88.6	115	773	112	0.755	0	12.2

#### **Matrix Duplicate**

**Sample:** 1034412001 **MD:** 197412

Analyzed: 12/18/2010 00:47 Analyzed: 12/18/2010 00:54

Units: ug/L					
Analyte	Result	Result	RPD	QC Li	mits
Cadmium	ND	ND	NA	0	8.3
Chromium	ND	ND	NA	0	9.8
Copper	ND	ND	NA	0	7.3
Iron	310	302	2.75	0	20
Magnesium	7000	6690	4.56	0	20
Nickel	0.61	0.584	4.36	0	20
Lead	ND	ND	NA	0	10.7
Selenium	ND	ND	NA	0	30.2
Silver	ND	ND	NA	0	56.5
Zinc	260	244	6.2	0	12.2

#### **Symbols and Definitions**

See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.

Tuesday, January 04, 2011 QCS V1.5





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Matrix Duplicate**

Sample:       1034412021         Analyzed:       12/18/2010 03:58         Units:       ug/L			197415 12/18/201	0 04:04	
Analyte	Result	Result	RPD	QC Li	mits
Cadmium	0.8	0.847	5.71	0	8.3
Chromium	ND	ND	NA	0	9.8
Copper	0.86	0.92	6.74	0	7.3
Iron	510	539	5.44	0	20
Magnesium	9600	9730	1.33	0	20
Nickel	1.3	1.41	8.19	0	20
Lead	ND	ND	NA	0	10.7
Selenium	ND	ND	NA	0	30.2
Silver	ND	ND	NA	0	56.5
Zinc	210	224	6.27	0	12.2

\* - See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Initial Calibration Verification**

ICV: 200055

**Analyzed:** 12/17/2010 17:16

Units: ug/L Criteria: + 10%

Criteria: ± 10%				
Analyte	Result	Target	% Rec.	
Cadmium	261	250	104	
Chromium	250	250	100	
Copper	250	250	100	
Iron	674	750	<b>*</b> 89.9	
Nickel	247	250	99	
Lead	249	250	99.6	
Selenium	252	250	101	
Silver	257	250	103	
Zinc	254	250	102	

ICV: 200094

Analyzed: 12/28/2010 17:02

Units: ug/L Criteria: ± 10%

 Analyte
 Result
 Target
 % Rec.

 Magnesium
 747
 750
 99.6

#### **Continuing Calibration Verification**

CCV: CCV: 200063 200066 200069 Analyzed: 12/17/2010 18:53 Analyzed: 12/17/2010 20:13 Analyzed: 12/17/2010 21:33 Units: Units: Units: ug/L ug/L ug/L Criteria: ± 10% Criteria: ± 10% Criteria: ± 10% **Analyte** Result **Target** % Rec. Result **Target** % Rec. Result **Target** % Rec. 203 200 199 201 200 Cadmium 101 200 99.6 100 Chromium 211 200 210 200 203 200 106 105 101 211 200 105 208 200 201 200 101 Copper 104 Iron 204 200 102 193 200 96.4 187 200 93.5 213 107 210 200 202 200 101 Nickel 200 105 200 Lead 204 200 102 207 200 103 208 104 199 200 99.6 205 200 103 199 200 99.5 Selenium 200 200 200 Silver 198 99.2 196 97.9 199 99.6 Zinc 217 200 109 213 200 107 212 200 106

#### Symbols and Definitions

See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable

Tuesday, January 04, 2011





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

200091

#### **Continuing Calibration Verification**

CCV: 200072 CCV: 200075 CCV: 200081 Analyzed: 12/17/2010 22:52 Analyzed: 12/18/2010 00:11 Analyzed: 12/18/2010 02:50

Units: ug/L **Units:** ug/L **Units:** ug/L

Criteria: ± 10%				Criteria:	± 10%		Criteria:	± 10%	
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Cadmium	207	200	103	206	200	103	399	400	99.9
Chromium	212	200	106	212	200	106	413	400	103
Copper	209	200	104	208	200	104	407	400	102
Iron	197	200	98.4	195	200	97.4	388	400	97.1
Nickel	210	200	105	211	200	106	414	400	104
Lead	211	200	106	213	200	107	421	400	105
Selenium	202	200	101	203	200	102	397	400	99.3
Silver	201	200	101	201	200	101	393	400	98.2
Zinc	216	200	108	191	200	95.3	426	400	106

CCV: 200084

Analyzed: 12/18/2010 04:10 Analyzed: 12/18/2010 05:24

ug/L Units: Units: ug/L Critoria:

Criteria: ± 10%	_			Criteria: ±	10%		
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	
Cadmium	387	400	96.9	405	400	101	
Chromium	391	400	97.8	422	400	105	
Copper	388	400	97	416	400	104	
Iron	366	400	91.5	412	400	103	
Nickel	392	400	98	420	400	105	
Lead	413	400	103	420	400	105	
Selenium	386	400	96.4	403	400	101	
Silver	374	400	93.4	396	400	99	
Zinc	404	400	101	432	400	108	

#### **Continuing Calibration Verification**

CCV: 200057 Analyzed: 12/17/2010 17:33 Units: ug/L Criteria: ± 10%				Analyzed: Units:	200064 12/17/2010 18 ug/L ± 10%	3:59	Analyzed: 1	200078 12/18/2010 01 ug/L ± 10%	:30
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Chromium	53.1	50	106	996	1000	99.6	211	200	106
Copper	53.8	50	108	1020	1000	102	210	200	105
Iron	50	50	100	994	1000	99.4	204	200	102
Nickel	48	50	95.9	976	1000	97.6	212	200	106
Lead	47.8	50	95.5	1010	1000	101	213	200	106

#### Symbols and Definitions

- See Comments section for more information

RPD - Relative % Difference (Spike / Spike Duplicate) Sample result is greater than 4 times the spike added. ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.

Tuesday, January 04, 2011 Page 6 of 15 **QCS V1.5** 





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Continuing Calibration Verification**

 CCV:
 200057

 Analyzed:
 12/17/2010 17:33

 CCV:
 200064

 Analyzed:
 12/17/2010 18:59

 Analyzed:
 12/18/2010 01:30

 Units:
 ug/L
 Units:
 ug/L

 Criteria:
 ± 10%
 Criteria:
 ± 10%

 Criteria:
 ± 10%
 Criteria:
 ± 10%

% Rec. Result % Rec. **Analyte** Result **Target Target** % Rec Result **Target** 50.6 50 995 201 200 Selenium 101 1000 99.5 100 Silver 51.3 50 103 963 1000 198 200 99.1 96.3 50 49.3 200 Zinc 98.6 1020 1000 102 192 95.8

CCV: 200079 CCV: 200085 CCV: 200092

 Analyzed:
 12/18/2010 01:36
 Analyzed:
 12/18/2010 04:16
 Analyzed:
 12/18/2010 05:29

 Units:
 ug/L
 Units:
 ug/L

 Units:
 ug/L
 Units:
 ug/L

 Criteria:
 ± 10%
 Criteria:
 ± 10%

 Criteria:
 ± 10%
 Units:
 ug/L

Official ± 1070				Officia.	1070		Officia.	- 1070	
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Cadmium	993	1000	99.3	994	1000	99.4	994	1000	99.4
Chromium	989	1000	98.9	1020	1000	102	1010	1000	101
Copper	968	1000	96.8	1000	1000	100	979	1000	97.9
Iron	919	1000	91.9	960	1000	96	944	1000	94.4
Nickel	971	1000	97.1	1010	1000	101	987	1000	98.7
Lead	1020	1000	102	1040	1000	104	1020	1000	102
Selenium	968	1000	96.8	974	1000	97.5	964	1000	96.4
Zinc	1010	1000	101	1060	1000	106	1020	1000	102

#### **Continuing Calibration Verification**

CCV: 200067 CCV: 200070 CCV: 200073

Analyzed: 12/17/2010 20:19 | Analyzed: 12/17/2010 21:38 | Analyzed: 12/17/2010 22:57

 Units:
 ug/L
 Units:
 ug/L
 Units:
 ug/L

 Criteria:
 ± 10%
 Criteria:
 ± 10%
 Criteria:
 ± 10%

= :0,0					0,0			, .	
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Cadmium	986	1000	98.6	1000	1000	100	966	1000	96.6
Chromium	962	1000	96.2	971	1000	97.1	948	1000	94.8
Copper	936	1000	93.6	945	1000	94.5	909	1000	90.9
Nickel	939	1000	93.9	950	1000	95	916	1000	91.6
Lead	998	1000	99.8	1020	1000	102	986	1000	98.6
Selenium	967	1000	96.7	980	1000	98	941	1000	94.1
Zinc	965	1000	96.5	978	1000	97.8	951	1000	95.1

CCV: 200076 CCV: 200082

Analyzed: 12/18/2010 00:17 Analyzed: 12/18/2010 02:56

 Units:
 ug/L

 Criteria:
 ± 10%

 Units:
 ug/L

 Criteria:
 ± 10%

 Analyte
 Result
 Target
 % Rec.
 Result
 Target
 % Rec.

 Cadmium
 990
 1000
 99
 999
 1000
 99.9

#### **Symbols and Definitions**

\* - See Comments section for more information RPD - Relative % Difference (Spike / Spike Duplicate)

Sample result is greater than 4 times the spike added.

ND - Not Detected

OC results are not adjusted for resistant approximation, where analysis had

QC results are not adjusted for moisture correction, where applicable.





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Batch: EMS/2494 (HBN: 60070) Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Continuing Calibration Verification**

CCV: 200076 Analyzed: 12/18/2010 00:17 Units: ug/L Criteria: ± 10%				Analyzed: (	200082 12/18/2010 02 ug/L ± 10%	<u>::56</u>	
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	
Chromium	967	1000	96.7	955	1000	95.5	
Copper	946	1000	94.6	936	1000	93.6	
Nickel	955	1000	95.5	940	1000	94	
Lead	1020	1000	102	1040	1000	104	
Selenium	965	1000	96.5	963	1000	96.3	
Zinc	979	1000	97.9	981	1000	98.1	

Continuing Calibration Veri	fication								
CCV: 200096 Analyzed: 12/28/2010 17:14 Units: ug/L Criteria: ± 10%				Analyzed: (	200097 12/28/2010 17 ug/L ± 10%	7:20	Analyzed: Units:	200101 12/28/2010 18 ug/L ± 10%	3:34
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Magnesium	49	50	98	509	500	102	209	200	105
CCV: 200102 Analyzed: 12/28/2010 18:39 Units: ug/L Criteria: ± 10%				Analyzed: 1	200105 12/28/2010 19 ug/L ± 10%	9:57	Analyzed: Units:	200107 12/28/2010 21 ug/L ± 10%	1:10
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Magnesium	995	1000	99.5	998	1000	99.8	210	200	105
CCV: 200108 Analyzed: 12/28/2010 21:15 Units: ug/L Criteria: ± 10%				Analyzed: 1	200110 12/28/2010 23 ug/L ± 10%	3:48	Analyzed: Units:	200111 12/28/2010 23 ug/L ± 10%	3:54
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Magnesium	990	1000	99	209	200	104	1000	1000	100
CCV: 200113 Analyzed: 12/29/2010 01:07				Analyzed:	200114 12/29/2010 01 ug/L	1:13	Analyzed:	200116 12/29/2010 02 ug/L	2:26
Units: ug/L Criteria: ± 10%					± 10%			± 10%	
3	Result	Target	% Rec.		J	% Rec.		•	% Rec.

#### **Symbols and Definitions**

- See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.

Tuesday, January 04, 2011





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

**Basis:** ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

CCV: 200117 CCV: CCV: 200122 200119

Analyzed: 12/29/2010 02:32 Analyzed: 12/29/2010 03:45 Analyzed: 12/29/2010 05:03

Units: **Units: Units:** ug/L ug/L ug/L Criteria: Criteria: Criteria: ± 10% ± 10% ± 10%

% Rec. Result % Rec. **Analyte** Result **Target Target** % Rec. Result **Target** 200 918 1000 196 200 200 Magnesium 91.8 97.8 99.8

CCV: CCV: 200125 CCV: 200128 200123

Analyzed: 12/29/2010 06:22 Analyzed: 12/29/2010 07:40 Analyzed: 12/29/2010 05:08

**Units: Units: Units:** ug/L ug/L ug/L ± 10% Criteria: ± 10% Criteria: ± 10% Criteria:

Result % Rec. Result **Target** % Rec. **Target** % Rec. **Analyte Target** Result

907 200 Magnesium 1000 90.7 186 200 92.8 197 98.6

CCV: 200133 CCV: 200134

Analyzed: 12/29/2010 08:46 Analyzed: 12/29/2010 08:40

Units: **Units:** ug/L ug/L

Criteria: Criteria: ± 10% ± 10% **Target Analyte** Result **Target** % Rec. Result % Rec

200 Magnesium 200 99.8 923 1000 92.3

CCV: 200302

Analyzed: 12/17/2010 17:39

**Units:** ug/L Criteria: ± 10%

Result **Target** % Rec. **Analyte** Cadmium 492 500 98.3

#### **Initial Calibration Blank**

ICB: 200056

Analyzed: 12/17/2010 17:27

Units: ug/L		
Analyte	Result	Qual.
Cadmium	ND	U
Chromium	ND	U
Copper	ND	U
Iron	ND	U
Nickel	ND	U
Lead	ND	U
Selenium	ND	U
Silver	ND	U
Zinc	ND	U

#### **Symbols and Definitions**

- See Comments section for more information

RPD - Relative % Difference (Spike / Spike Duplicate) ND - Not Detected

Sample result is greater than 4 times the spike added.

QC results are not adjusted for moisture correction, where applicable

Tuesday, January 04, 2011 **QCS V1.5** Page 9 of 15





### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Initial Calibration Blank**

ICB: 200095

**Analyzed:** 12/28/2010 17:08

Units: ug/L

 Analyte
 Result
 Qual.

 Magnesium
 ND
 U

#### **Continuing Calibration Blank**

Analyzed: 12/17/2010 17:45			CCB: 200065 Analyzed: 12/17/2010 1 Units: ug/L	9:05	CCB: 200068 Analyzed: 12/17/2010 2 Units: ug/L	0:25
Analyte	Result	Qual.	Result	Qual.	Result	Qual.
Cadmium	ND	U	ND	U	ND	U
Chromium	ND	U	ND	U	ND	U
Copper	ND	U	ND	U	ND	U
Iron	ND	U	ND	U	ND	U
Nickel	ND	U	ND	U	ND	U
Lead	ND	U	ND	U	ND	U
Selenium	ND	U	ND	U	ND	U
Silver	ND	U	ND	U	ND	U
Zinc	ND	U	ND	U	ND	U

Analyzed: 12/17/2010 21:44 | Analyzed: 12/17/2010 23:03 | Analyzed: 12/18/2010 00:23

Units: ug/L	Units: ug/L		Units: ug/L				
Analyte	Result	Qual.	Result	Qual.	Result	Qual.	
Cadmium	ND	U	ND	U	ND	U	
Chromium	ND	U	ND	U	ND	U	
Copper	5.73		ND	U	ND	U	
Iron	ND	U	ND	U	ND	U	
Nickel	ND	U	ND	U	ND	U	
Lead	ND	U	ND	U	ND	U	
Selenium	ND	U	ND	U	ND	U	
Silver	ND	U	ND	U	ND	U	
Zinc	ND	U	ND	U	ND	U	

#### **Symbols and Definitions**

See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

Cont	tinuino	ı Calibrati	ion Blank
------	---------	-------------	-----------

Analyzed: 12/18/2010 01:41			CCB: 200083 Analyzed: 12/18/2010 0 Units: ug/L	3:01	CCB: 200086 Analyzed: 12/18/2010 0 Units: ug/L	4:22
Units: ug/L			Offits. ug/L		Offits. ug/L	
Analyte	Result	Qual.	Result	Qual.	Result	Qual.
Cadmium	ND	U	ND	U	ND	U
Chromium	ND	U	ND	U	ND	U
Copper	ND	U	ND	U	ND	U
Iron	ND	U	ND	U	ND	U
Nickel	ND	U	ND	U	ND	U
Lead	ND	U	ND	U	ND	U
Selenium	ND	U	ND	U	ND	U
Silver	ND	U	ND	U	ND	U
Zinc	ND	U	ND	U	ND	U

CCB: 200093

Analyzed: 12/18/2010 05:35

Units: ug/L			
Analyte	Result	Qual.	
Cadmium	ND	U	
Chromium	ND	U	
Copper	ND	U	
Iron	ND	U	
Nickel	ND	U	
Lead	ND	U	
Selenium	ND	U	
Silver	ND	U	
Zinc	ND	U	

#### **Continuing Calibration Blank**

CCB: 200098 200103 200106

Analyzed: 12/28/2010 17:26 Analyzed: 12/28/2010 18:45 Analyzed: 12/28/2010 20:03

**Units:** ug/L **Units:** ug/L **Units:** ug/L

Result Qual. Result Qual. Result Qual. Analyte Magnesium ND ND ND

#### Symbols and Definitions

- See Comments section for more information

 Sample result is greater than 4 times the spike added. ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.

RPD - Relative % Difference (Spike / Spike Duplicate)

Tuesday, January 04, 2011





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

**Basis:** ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Continuing Calibration Blank**

CCB: 200109 CCB: CCB: 200112 200115 Analyzed: 12/28/2010 21:21 Analyzed: 12/28/2010 23:59 Analyzed: 12/29/2010 01:18 **Units:** ug/L **Units:** ug/L Units: ug/L

Result Result **Analyte** Result Qual Qual. Qual. ND U ND ND Magnesium U U

CCB: 200118 CCB: 200121 CCB: 200124

Analyzed: 12/29/2010 02:37 Analyzed: 12/29/2010 03:56 Analyzed: 12/29/2010 05:14

Units: ug/L **Units:** ug/L **Units:** ug/L

Qual Result Qual. Result **Analyte** Result Qual. ND U ND U ND U Magnesium

CCB: 200127 CCB: 200130

Analyzed: 12/29/2010 06:33 Analyzed: 12/29/2010 07:51

**Units: Units:** ug/L ug/L

**Analyte** Result Qual. Result Qual. ND U Magnesium ND U

#### **Serial Dilution**

Sample: 1034412001 SD: 198242

Analyzed: 12/18/2010 00:47 Analyzed: 12/18/2010 01:18

Units: ug/L						
Analyte	Result	Result	RPD	QC Lin	nits	
Cadmium	ND	ND	NA	0	8.3	
Chromium	ND	ND	NA	0	9.8	
Copper	ND	ND	NA	0	7.3	
Iron	313	337	7.27	0	20	
Magnesium	7020	6880	1.94	0	20	
Nickel	ND	ND	NA	0	20	
Lead	ND	ND	NA	0	10.7	
Selenium	ND	ND	NA	0	30.2	
Silver	ND	ND	NA	0	56.5	
Zinc	257	232	10.2	0	12.2	

Sample: 1034412021 SD: 198244

Analyzed: 12/18/2010 03:58 Analyzed: 12/18/2010 04:46

**Units:** ug/L

RPD Result Result **QC Limits Analyte** Cadmium ND ND NA 0 8.3 0 Chromium ND ND NA 9.8

#### **Symbols and Definitions**

- See Comments section for more information

RPD - Relative % Difference (Spike / Spike Duplicate) ND - Not Detected

Sample result is greater than 4 times the spike added.

QC results are not adjusted for moisture correction, where applicable.

Tuesday, January 04, 2011 **QCS V1.5** Page 12 of 15





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Serial Dilution**

Sample: 1034412021 SD: 198244

Analyzed: 12/18/2010 03:58 Analyzed: 12/18/2010 04:46

Units: ug/L						
Analyte	Result	Result	RPD	QC Lir	nits	
Copper	ND	ND	NA	0	7.3	
Iron	515	622	19	0	20	
Magnesium	9620	10100	4.51	0	20	
Nickel	ND	ND	NA	0	20	
Lead	ND	ND	NA	0	10.7	
Selenium	ND	ND	NA	0	30.2	
Silver	ND	ND	NA	0	56.5	
Zinc	213	260	<b>*</b> 20.1	0	12.2	

### **Post Digestion Spike**

PDS: Sample: 1034412021 198243

Analyzed: 12/18/2010 03:58 Analyzed: 12/18/2010 04:40

Units: ug/L

Analyte	Result	Result	Target	% Recovery	QC Lin	nits	
Cadmium	ND	42.9	50	<b>*</b> 84.3	90.1	113.3	
Chromium	ND	210	200	105	90	112.2	
Copper	ND	204	200	101	89.2	114.6	
Iron	515	1670	1000	<b>*</b> 116	90	106.2	
Nickel	ND	208	200	104	89.9	114.1	
Lead	ND	102	100	102	91.2	111.3	
Selenium	ND	50.2	50	99.4	75.9	123.6	
Silver	ND	41.6	50	83.1	36.2	154.5	
Zinc	213	757	500	109	88.6	115	

PDS: 1034412001 198241 Sample:

Analyzed: 12/18/2010 01:12 Analyzed: 12/18/2010 00:47

Units: ug/L	•		•				
Analyte	Result	Result	Target	% Recovery	QC Lir	nits	
Cadmium	ND	82.8	100	<b>*</b> 82.8	90.1	113.3	
Chromium	ND	395	400	98.7	90	112.2	
Copper	ND	380	400	94.8	89.2	114.6	
Iron	313	2310	2000	100	90	106.2	
Nickel	ND	383	400	95.7	89.9	114.1	
Lead	ND	198	200	99.2	91.2	111.3	
Selenium	ND	95.8	100	95.2	75.9	123.6	

#### Symbols and Definitions

- See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.

Tuesday, January 04, 2011





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: EPA 3010, SW 6020 Water Prep Analysis: SW 6020

Basis: ALS Laboratory Group Batch: EMS/2488 (HBN: 59782) Batch: EMS/2494 (HBN: 60070)

Prepared By: Kristie F. Bitner Analyzed By: Kristie F. Bitner

#### **Post Digestion Spike**

Sample: 1034412001 Analyzed: 12/18/2010 00:47 Units: ug/L		_	198241 12/18/2010 01	1:12			
Analyte	Result	Result	Target	% Recovery	QC Lir	nits	
Silver	ND	93.5	100	93.5	36.2	154.5	
Zinc	257	1210	1000	95.6	88.6	115	

#### **Comments**

None

QC Data A	pproved and	Reviewed by
-----------	-------------	-------------

#### **Symbols and Definitions**

\* - See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.





#### **Analysis Information**

Workorder: 1034412

Limits: Historical/Performance Preparation: NA Analysis: SW 9012

Basis: ALS Laboratory Group Batch: NA Batch: EWC/2958 (HBN: 59593)

Prepared By: NA Analyzed By: Holly Martin

#### **Comments**

None

#### QC Data Approved and Reviewed by

 Holly Martin
 Rosemary Hanks
 12/14/2010

 Analyst
 Peer Review
 Date

#### **Symbols and Definitions**

\* - See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.



#### **Case Narrative**

Method:

EPA 130.2

Client:

Anderson Engineering Company

Analysis:

Hardness

Account:

8001

**Preparation SOP #:** 

NA

Matrix:

water

Analysis SOP #:

IC-EP-130.2

Lot/Release/SDG #:

NA

ALS Set ID:

1106245

HBN#: 63020

**General Set Information:** 

The samples in this set were analyzed for hardness as

equivalent mg of calcium carbonate per liter. The MDL/RL for

this analyte is 3.00/10. mg/L.

Method Summary:

An aliquot of sample (2-50 ml) is placed in a beaker and enough ASTM type II water added to make approximately 50 ml. A small scoop of Eriochrome Black T indicator and 1 ml of buffer solution are added and the sample is titrated with EDTA titrant until the endpoint is reached. The sample is

stirred continuously throughout.

**Sample Preparation:** 

Samples were prepared in accordance with published

procedures.

**Hold Times:** 

Hardness analysis was requested several months after

receipt of samples, and was completed on 03/04/11.

Dilution(s):

Dilutions are not applicable to this method, if results are high

a smaller aliquot of sample is analyzed.

Method QC (MB, LCS):

LCS and blank data are within acceptable limits.

Matrix QC (MS, MD, MSD):

No MS/MSD is performed for this method, the MD is within

acceptable parameters.

Instrument QC (ICV, CCV, etc):

There is no instrument QC applicable to this method.

Flagging Codes:

None required.

NC/CAR:

None

Sample Calculation:

Hardness (as equivalent mg CaCO3/L) = ml EDTA titrant x N,

EDTA x 50,000 / mL of sample

**Miscellaneous Comments:** 

None.

Name: Rosemary H. Hanks

Date: 03/04/11





#### **Analysis Information**

Workorder: 1106245

Limits: Historical/Performance Preparation: NA Analysis: EPA 130.2

Basis: ALS Laboratory Group Batch: NA Batch: EWC/3049 (HBN: 63020) Prepared By: NA Analyzed By: Rosemary Hanks

**Blank** 

LMB: 208744

Analyzed: 03/04/2011 00:00

Units: mg/L Result **MDL** RL **Analyte** 10 Hardness (as CaCO3) ND 3

**Laboratory Control Sample** 

LCS: 208745

Analyzed: 03/04/2011 00:00

Units: mg/L

**Analyte** Result % Recovery **QC** Limits **Target** 105 Hardness (as CaCO3) 100 105 80 120

**Matrix Duplicate** 

Sample: 1106245001 MD: 208746

Analyzed: 03/04/2011 00:00 Analyzed: 03/04/2011 00:00

**Units:** 

mg/L Result Result **RPD QC Limits Analyte** Hardness (as CaCO3) 150 145 3.07 0 20

Symbols and Definitions

- See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.





#### **Analysis Information**

Workorder: 1106245

Limits: Historical/Performance Preparation: NA Analysis: EPA 130.2

Basis: ALS Laboratory Group

Batch: NA

Batch: EWC/3049 (HBN: 63020)

Prepared By: NA

Analyzed By: Rosemary Hanks

#### **Comments**

None

#### QC Data Approved and Reviewed by

 Rosemary Hanks
 Penny A. Foote
 3/7/2011

 Analyst
 Peer Review
 Date

#### **Symbols and Definitions**

\* - See Comments section for more information

Sample result is greater than 4 times the spike added.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected

QC results are not adjusted for moisture correction, where applicable.





1034412 1034

# **ALS Laboratory Group**

				Field (	Chain-of-Cu	stod	v R	600 - E	ord			<u>,</u>	. 7/	30	1/	H	140
(ALS)				1 1010 0			· y · ·	.000	1		7	531	606		<u> </u>	<u> </u>	Page of
Client Name & Addre Anderson Ene 977 West 210 Salt Lake Ci	ss: gineering Co., o Scuth	Inc.	Project No.:			Preservation Gode	Sample Matrix Code	ample for Matrix QC	V	10		/ses Req	uested	-/ 		Ø	Matrix Codes:  W) Water B) Bulk L) Liquid F) Filter S) Soil G) Wipe
Salt Lake Ci	ty, VT 84119		Project Name:	Rice Su	rface	servatic	ole Mati	e for M	Metals	Metal	cyanide)					Containers	C) Solid M) Media  Preservation Codes:
Phone: 801 -9.7	2-6222		Water Si			Pre	Samp	ampl		=				·		of Cor	1) Cool to 4°C 2) HCl to pH<2, 4°C
FAX: 801- 97	2-6235		Sampler: (Sign					Š	3	erat	عِيْ				3	0, o	3) H₂SO₄ to pH<2, 4°C 4) HNO₃ to pH<2, 4°C
FAX: gal- 97 e-mail: m defriez (	2 andersoneng	. Com	2k-1	1.70	1			Str. 1	Dissolved	Total Recoverable	40						5) NaOH to pH>12, 4°C 6) ZnOAc/NaOH to pH>9, 4°C
Field Sample Number	Site ID	Date	Time	Depth	ALS Sample Number	-				<del>                                     </del>						-	Remarks
DR-1	Rico	12/3/10	2:15 pm			-	<u> </u>		X	×	×					3	
DR-3	Rico	12/3/10	3:10 pm				<u> </u>		×	×		_		_		2	
DR-50	Rico	12/3/10	4:20 pm				<u> </u>		X	×						2	
FB	Rico	12/4/10	9:11am						X	X						2	
DR-SI	Rico	12/4/10	10:48am				<u> </u>		X	×						2	
DR-52	Rico	12/4/10	11:15am				<u> </u>		×	X						2	<u></u>
DR-6	Rico	12/4/10	11:57am				<u> </u>		X	X				$\sqcup$		2	
DR-Z	Rico	12/4/10	12:150m				<u> </u>		X	又						2	
DR-7	Rico	12/4/10	12:43pm						×	X	X					3	
DR-4-5W	Rica	12/4/10	7:38 pm						X	X						2	
Possible Hazard Ide			Sample Dispo							N 4 L		Request □ 48 ⊦					s □ 21 Days
Non-Hazard	☐ Skin Irritant ☐ Poison	□ Rad □ Unknown	Return to		•	П	Archiv	e for_		_ Mont	ns	☐ 72 F					
│□ Flammable │	ы Poison	- Olkhown	(a fee may be as	sessed if sample	s are retained longer th	an 3 mo	onths)					t .	-	-			ously approved)
								Ca	arrier/	/Airbil	l #:						
Relinquished by: (Signature)  Received by: (Signature)  Received by: (Signature)											12	<u> </u>	) /3	3:41	ALS I		atory Group
Relinquished by: (Sign	nature)		C	Received by: (S	Signature) /							Date .	Ti		Salt I. Phor	_ake 0 1e: (80	LeVoy Drive City, UT 84123 00) 356-9135
Relinquished by: (Sign	nature)			Received by: (5	Signature)							Date	Ti				01) 266-7700 11) 268-9992

White - Laboratory Copy

Yellow - Client Copy

www.datachem.com



# ALS Laboratory Group

Field Chain-of-Custody Record

(ALS)							, .										Page <u>2</u> of <u>2</u>
Client Name & Addre Andurson En 977 West Salk Lake ( Phone: 801-97	ngineering Co 2100 South City, UT 84119 2-6222	, Inc.	Project No.:  Project Name:  Water \$		nface	Preservation Code	Sample Matrix Code	Sample for Matrix QC	Dissolved Metals	Metals	Апају	ses Red	juested	i i		f Containers	Matrix Codes: W) Water B) Bulk L) Liquid F) Filter S) Soil G) Wipe C) Solid M) Media  Preservation Codes: 1) Cool to 4°C 2) HCl to pH<2, 4°C
FAX: 801-97	?2-6235 20 andersone		Sampler: (Sign	nature)   1-2	5			S	ssolve	Total Recoverable						No. of	3) H <sub>2</sub> SO <sub>4</sub> to pH<2, 4°C 4) HNO <sub>3</sub> to pH<2, 4°C 5) NaOH to pH>12, 4°C 6) ZnOAc/NaOH to pH>9, 4°C
Field Sample Number	Site ID	Date	Time	Depth	ALS Sample Number				Die	201						- 4	Remarks
DR-G	DICO	12/4/10	3:10 pm						X							2	
											ĺ						
W. C 200 - 100						1							1				
			<b>-</b>			+							$\dagger$				
						-					_		+	-			-
						-							-	ļ			
	ļ													<u> </u>	<u> </u>		
						1											
											$\neg$			1	†		
Possible Hazard Ide 図 Non-Hazard 口 Flammable	entification  Skin Irritant Poison	□ Rad □ Unknown	Sample Dispo  Return to  Disposal to  (a fee may be as:	Client by Lab	s are retained longer tha			e for _		Month	ns	Reques: 48 H 72 H Rush is e	Hours (F Hours (F	Rush) Rush)		7 Days 14 Day	
								Ca	rrier/	Airbill	#:			·			
Relinquished by: (Sigr		-		Received by: (S. Received by: (S.	Ven Jass	ELP	)				D-	Date  O O	- 1	ime LU& ime	ALS 960 \ Salt I	Lake C	o: atory Group LeVoy Drive Dity, UT 84123 00) 356-9135
Relinquished by: (Sign	nature)			Received by: (S.	ignature)					`		Date	. T	ime	Phor FAX:	ne: (80 : (80	01) 266-7700 1) 268-9992 hem.com

White - Laboratory Copy

Yellow - Client Copy



Pro	ject / Job / Task	4	Split:	Worke	rder ID: 1034412			244. - 127.		artini Bartiniy		Requ	este	d Ana	lysis	K. si			
Clie	ent: Anderson Er	gineering Company			Account: 8001	Type: 500	)Poly												
Cor	nments:	Metals				Preservat	ives												
	Twa wan edak ekanas kule					HNO3		SW6020											
	Collect					Con	tainers												
Item	Date/Time	Sample ID	Lab ID	QC	Matrix	ID(s)	Count												
1	12/03/2010 14:15	DR-1	1034412001		Water	A, 8 173 6 1	?   41	Α				14.				- 1			
2	12/03/2010 15:10	DR-3	1034412002		Water	А,В	1 1	Α					ļ				الليا		
3 🖟 -	12/03/2010 16:20	DR-50	1034412003		Water	А,В	1 21	Α			15	1250		700	500		4		
4	12/04/2010 09:11	FB	1034412004	FLDBK	Water	А,В	21	A											
5	12/04/2010 10:48	DR-51	1034412005		Water	А,В	- 2 i	Α					4.4.			513			\$
6	12/04/2010 11:15	DR-52	1034412006		Water	А,В	21	Α									ļ!		25.00
7.	12/04/2010 11:57	DR-6	1034412007	The second of th	Water	А,В	21	A		al van Liveri		r years Filters				22.44 22.44	ħ.		SETE SECTION
8	12/04/2010 12:15	DR-2	1034412008		Water	А,В	1 7 1	Α										113.57	
9	12/04/2010 12:43	DR-7	1034412009		Water	A,B	21	Α	制度表						19% 19%			43	170
10	12/04/2010 14:38	DR-4-SW	1034412010		Water	A,B	2	Α		<u> </u>	<u> </u>	<u></u>				<u> </u>	<u> </u>	<u> </u>	<u></u>

				SAMPLE PRE	PARATION / A	NALYSIS CHAIN-OF-C	USTODY
ORIGIN	AL FIELD SAM	PLE CHAIN-OF-CUST	ODY	Sample Prep / Analysis for:			
				Prepared / Analyzed by:		Date / Time:	
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location	Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Moon, Boone C.	12/06/2010 13:48	ALS Sample Receiving	Sample Login				
Rh	12-10-10 1654	R-33 1C	Storage Sande Rep				
R-33-1 KB	1	ICP-MS lob	Sample Rep				
						-	
	***						



Pro	ject / Job / Task		Split:	Worke	order ID: 1034412			Requested Analysis											
Clie	ent: Anderson Er	gineering Company			Account: 8001	Type: 500Pc	oly												1
Co	سامک یل mments:	ed				Preservative	S												1
	-					HNO3		SW6020											
				5				l Q											
255	Collect					Contai	ners -		:										
Item	Date/Time	Sample ID	Lab ID	QC	Matrix	ID(s)	Count								Ŀ				L
11	12/04/2010 15:10	DR-G	1034412011	Complete Com	Water	A,B 12:10-10	71	Α										- 1546 - 5 144	
12	12/03/2010 14:15	DR-1D	1034412012		Water	A,B	21	Α											
13	12/03/2010 15:10	DR-3D	1034412013		Water	А,В	21	Α	An Au Tipe										
14	12/03/2010 16:20	DR-50D	1034412014		Water	A,B	71	Α											
15	12/04/2010 09:11	FBD	1034412015	FLDBK	Water	A,B	-21	Α			1954 1964			Scoto	M			No.	
16	12/04/2010 10:48	DR-51D	1034412016		Water	A,B	21	Α					<u> </u>						<u></u>
17	12/04/2010 11:15	DR-52D	1034412017	(10 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Water	A,B	21	A					1972		存				
18	12/04/2010 11:57	DR-6D	1034412018		Water	A,E	2 1	Α											
19	12/04/2010 12:15	DR-2D	1034412019		Water	A,B	* 1	Α			province Parties					11.50 10.55			能够
20	12/04/2010 12:43	DR-7D	1034412020		Water	A,B	\$ 1	Α					<u></u>	<u></u>	$oldsymbol{ol}}}}}}}}}}}}}}}}}$	<u></u>	<u> </u>		<u> </u>

				SAMPLE PRE	PARATION / A	NALYSIS CHAIN-OF-C	USTODY
ORIGIN	AL FIELD SAM	PLE CHAIN-OF-CUST	ODY	Sample Prep / Analysis for:		Lab Notebook No	
				Prepared / Analyzed by:		Date / Time:	
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location	Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Moon, Boone C.	12/06/2010 13:48	ALS Sample Receiving	Sample Login				
le	12-10-10 1651	R-33 10	Storage				
R-33-1 KB		ICP-MS Lab	Prep				



Pro	ject / Job / Task:		Split:	Worke	rder ID: 1034412				Requested Analysis								345			
Clie	ent: Anderson En	gineering Company			Account: 8001	Type: 50	0Poly													
Cor	nments:					Preserva	itives													
						HNO3			SW6020											
	Collect					Co	ntainers		δ											
Item	Date/Time	Sample ID	Lab ID	QC	Matrix	ID(s)	Col	int												
21	12/04/2010 14:38	DR-4-SW	1034412021	Professional Control	Water	A,8 12:10	9-10 U	<b>?</b> 1	Α			4.3			35	7.75es V: 7.5.	1-30 -05			
22	12/04/2010 15:10	DR-GD	1034412022		Water	A,B		1	Α											
23									4									10 (10 A) 10 (10 A) 10 (10 A)		
24																	(and the control of the			
25	The State of the S		· 多种大量,现在是2							5		147 S 1 (2)4 1 (2)5		4.0						
26																				
27		Canada Transport Control of the Canada Contr	等/学/香港等。	e i ji gilligerada Birtana i izi		Markey gar Selection					agente Gallerin									P. Gray. P. State
28																				
29	The problem			75 a 16 (17 a)		7 - 1944 3 - 444 (14	計 多蒙			Salk P				17			<b>维生</b>		274	
30																				

				SAMPLE PRE	PARATION / A	NALYSIS CHAIN-OF-C	USTODY
ORIGIN	AL FIELD SAM	PLE CHAIN-OF-CUSTO	DY	Sample Prep / Analysis for:		Lab Notebook No	
				Prepared / Analyzed by:		Date / Time:	
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location	Relinquished By: (Signature)	Date / Time	Received By; (Signature)	Reason for Transfer / Storage Location
Moon, Boone C.	12/06/2010 13:48	ALS Sample Receiving	Sample Login				
RM	12-10-10 1651	R-33 1D	Storage				
R-833-1 kB	1	ICE-MS lab	Storage				



Pro	ject / Job / Task:		Split:	Worko	rder ID: 1034412			2.0				Requ	este	d Ana	ilysis	San S	Marie II. Kalendari	
Clie	ent: Anderson En	gineering Company			Account: 8001	Type: 1000/	\G											
Cor	nments:					Preservative	<b>s</b>	w/Micro Dist										
Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Contai	ners Count	SW 9012										
1	12/03/2010 14:15	DR-1	1034412001		Water	С	1	С	ing ing Tok	New Y	1800			11		ye.g	17.7	
2	12/04/2010 12:43	DR-7	1034412009		Water	С	1	С										
3										- 11 - 12								
4																material colonia.		
5	Employee Training				"现代更大 <b>的</b> 情况"。现代基础	A STATE OF BUILDINGS		Mary Mark			110a 2004							
6																	 <u> </u>	
7	The second secon					等的现代的	環構工	701120 2017-00						15 m 24 m 2 m 2 m				
8																		
9				Antiger we fight					-34				799		出がな	ger Jercii,		100
10																		

				SAMPLE PRE	PARATION / A	NALYSIS CHAIN-OF-C	USTODY
ORIGIN	AL FIELD SAM	PLE CHAIN-OF-CUSTO	ODY	Sample Prep / Analysis for:			•
				Prepared / Analyzed by:		Date / Time:	
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location	Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Moon, Boone C.	12/06/2010 13:48	ALS Sample Receiving	Sample Login				
RE	12:10:10 1128	R-33 2B	Storage				
R33 2B	14/3/10 0930	waterlabthu	Analysis # 25				
Waterlabtin	12/13/10/615	R403	733				
			÷				

1 BB Buotino	ALS Laborat	CODY CD	OID CATT I	ARECTO	Det are	n Tadeoday	ATION RE	POPT (CRIR)	
				R INFORMA					
Client Name	: Milerson	629	neerin	9	Project	Task/Site: _	1034	114/13/10:10 103	34412
Date/Time of	f Receipt:	7 (19:00:10) 12:00:10	<i>a</i> 13-0	e-10 134	·	r of Coolers			
Condition of Custody Sea		Present	able/Unacce /Absent/NA Broken/NA	È	Location	rature Contr in Temp Tal temperature	cen:	Present/Not Inclu Control/Retween	
Tamper Evid Ice Present:	lent:	Yes/No Yes/No		)	Are all	specific gui applicable p guidelines	Hs within	Yes/No/NA	
pH Check Performed:	Metals Cyanide Sulfide Ammonia	Yes, Yes, Yes,	/No/NA /No/NA /No/NA /No/NA /No/NA	Total Phenol TPH – 418.1 COD TKN	ics	Yes/No/NA Yes/No/NA Yes/No/NA Yes/No/NA	NO3/No Oil & C	02	Yes/No/NA Yes/No/NA Yes/No/NA Yes/No/NA
Residual Chlorine Check Performed:	8270 8081		/No/NA /No/NA	8310 8151		Yes/No/NA Yes/No/NA			Yes/No/NA
Cooler Received	DCL Cooler No.	Temp.	Cooler <u>Received</u>	DCL Coo	ler No.	Temp.	Cooler <u>Received</u>	DCL Cooler No.	Temp.
1	C02 7592	/0 °C	4	C02		°C	7	C02	°C
2	C02	°C	5	C02		°C	8	C02	
3	C02	°C	6	C02		°C	9	C02	°C
Taken By:	12	Signatur	re		Zw	re U	lecon	<u>17</u>	-6.10 Date
		···	CLIE	NT-RELATE	D INFOR	MATION			
Missing		1	sing Sample ken/Leaking	es/Bottles	☐ Inco	rrect Preser Criteria Not		☐ Insufficient Sa Volume	mple
☐ Missing	Conditions Paperwork	Inco	orrect Bottle	Туре	☐ Resi	dual Chlorii 1 Space in E	ne Present	Chain of Custo	ody
Labels	Incorrect Bottle		oler Tempera Range	itures Out	☐ rica	i space iii E	outes ,	Other:	Seal:
BRIEFLY DE	ESCRIBE THE PROF	BLEM AND	THE ACTION	TAKEN:			•		•
,									
	,								
Client Notif	ied? YES		No 🗌	(I	f yes, atta	ch client no	tification in	formation.)	
			Response	Required	Withir	ı 24 Hour	rs		
			PI	<b>РОЈЕСТ М</b>	ANAGE	MENT	British and		
PROJECT	MANAGER COMI	MENTS:				,	ı		

Returned to Sample Receipt by: ALS Project Manager: Revised 9/11/09 CRIR.doc